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SIXTH REPORT

ON THE

INJURIOUS AND OTHER INSECTS

OF THE

STATE OF NEW YORK.

Made to the Regents of the University, Pursuant to Chapter 355, of the Laws of 1883.

By J. A. LINTNER, Ph. D., State Entomologist.

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SIXTH REPORT

OF THE

STATE ENTOMOLOGIST ON THE INJURIOUS AND OTHER INSECTS OF THE STATE OF NEW YORK.

OFFICE OF THE STATE ENTOMOLOGIST,
ALBANY, *March* 20, 1890.

To the Legislature of the State of New York:

I have the honor to present to the Legislature, my Sixth Report on the Insects of the State of New York, which is also presented to the Regents of the University, as required by law.

Very respectfully,

J. A. LINTNER.

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REPORT.

OFFICE OF THE STATE ENTOMOLOGIST,
ALBANY, *December* 7, 1889.

To the Honorable the Regents of the University of the State of New York:

GENTLEMEN.— I have the honor of presenting to your board my Sixth Report on the Injurious and Other Insects of the State of New York.

I have again the privilege of recording the exemption of the crops of the State from any widespread serious insect attack, and a mitigation of some of the more formidable ones of preceding years.

Injuries to cereal crops have been remarkably few and local. While in several of the other States, as notably in Ohio, Indiana, and Illinois, the grain-aphis, *Siphonophora avenæ* (Fabr.) has been unusually destructive to wheat, oats and other of the grains, and it has also appeared in injurious numbers in New Jersey and in Pennsylvania, not a single instance of its occurrence in the State of New York has been reported to me.

The hop-aphis, *Phorodon humuli* (Schrank), which was the occasion in 1886 of almost the entire destruction of the hop crop of the State, again appeared during the month of July in the hop-yards of Schoharie and Montgomery counties in such numbers as to excite great alarm. Recommendation was made by the Entomologist and circulated through the local press, of earnest effort to arrest the attack in its then existing stage, by promptly and thoroughly spraying the infested vines with insecticidal washes; but fortunately this measure, attendant with considerable labor, was not found necessary, for the heavy rains that set in at the time, and continued for weeks thereafter, proved fatal to most of the hop-lice, and speedily rescued the crop from its threatened destruction.

In neglected orchards — in which category most of the orchards of our State find place — fruit insects have abounded to the extent that the fruit gathered, carried to market and sold, has, in

many instances been in a condition that rendered it absolutely unfit for table use — only suitable for feeding to animals who have not the privilege of selecting their food. At the same time, the intelligent and enterprising fruit-grower has been able to meet his hosts of insect enemies and triumph over them by means of the spraying devices and the insecticidal washes that the recent experiments and studies of our economic entomologists have placed in his hands and directed him how to use. The ravages of the apple-worm can now be so easily controlled, that worm-eaten apples should henceforth serve as an attestation of the ignorance, thriftlessness, or laziness of their grower. The destructive and dreaded plum-curculio is being so successfully fought that it will probably soon be brought under similar control.

May I, in the above connection, offer to the notice of your board an illustration of the benefit that may result from entomological studies in the promotion of the material interests of our people.

A scale-insect, known popularly from its peculiar appearance, as "the cottony-cushion scale," and scientifically as *Icerya Purchasi*, chanced, about twenty years ago, to be brought into California, on an acacia from Australia. From this plant it spread to various other plants, shrubs, and trees, "attacking almost everything," but manifesting a decided preference for the orange. It especially multiplied to such a degree upon the orange trees that within the last few years many thousands of them have been killed, and entire orchards broken up and abandoned. Every possible means known to science, in the use of washes or other applications, that gave promise of killing the insect, was resorted to, even to the costly experiment of constructing portable canvas tents of a capacity for inclosing the largest trees, and forcing within them, by the aid of an apparatus devised for the purpose, the deadly vapor of hydrocyanic acid gas. Yet notwithstanding all that science had been able to accomplish, the little scale continued to multiply alarmingly, and to extend its range, until it appeared as if the orange culture in California, yielding so large an income to the State, would soon have to be abandoned.

At this juncture the thought came that the unparalleled multiplication of this pernicious scale might largely be owing to its having been brought to this country unattended by the natural enemies that may have kept it under control in its native home,

where, as was known through correspondence, it had never been recognized as a pest. It was suggested that search be made in Australia by competent entomologists for its enemies, and if found, that the attempt be made to introduce them into California. Congress was appealed to for the appropriation needed for the purpose, but perhaps deeming the project chimerical, it was not granted.

Professor C. V. Riley, chief of the entomological division of the United States Department of Agriculture, who was the first to publicly recommend the measure, and to whom the credit is largely due of conducting it, under difficulties, to its completion, was at last able, through an appropriation made for the Melbourne exposition of last year, and the kind agency of the Department of State and the Melbourne commissioners, to dispatch to Australia two of the assistants in his division, for the collection and transmission hither of the supposed native enemies of the Icerya. Their mission was successful. Over 12,000 specimens of parasites and other enemies were collected and sent to Los Angeles, Cal., for propagation. Among them were two species that have proved of pre-eminent service; one, a minute two-winged fly, known as *Lestophonus icerya*, the larvæ of which live within the body of the scale-insect; and the other, a lady-bird, *Vedalia cardinalis*, of which both the larva and the beetle prey upon the scale. Such a wonderful prolificacy has the last-named insect displayed under the fostering care given to its propagation, that of the 129 individuals imported during the past winter, from its subsequent increase there have been sent away in a single week 50,000, for distribution throughout the orange orchards of the State. Their progeny may now be estimated "by the millions," and in some localities, where earliest introduced, the trees "are swarming with them."

The success attending this undertaking, even in the brief time that has elapsed, has really been phenomenal. The orange grower now points to orchards which he was about to abandon, where "to-day it is hard to find a single living scale." Mr. W. Catton Grasby, of Adelaide, Australia, who has recently visited this country to study its methods of teaching in natural history, and who had part in the successful colonization of the scale enemies, in that he had paid, in Adelaide, one pound ($5) a head for a large number of them, has stated to me that he had never witnessed such enthusiasm as that shown by the orange

growers in California over the result of this first attempt to fight our insect pests of foreign origin, by the importation of their natural parasites. They regard the fate of the Icerya as sealed, and predict that before the close of the year it will have been practically exterminated in all parts of the State where the lady-bird was early let loose upon it.

As an additional triumph for economic entomology, in winning from a high source attestation to the value of its services, I would mention that the French government has recently conferred on Professor C. V. Riley the high honor of enrollment as a Chevalier of the Legion of Honor, in consideration of his researches in applied entomology, particularly with reference to their value to French agriculture.

Returning from this digression to the notable insect events of the year:

The apple-tree tent-caterpillar, *Clisiocampa Americana*, whose abundance last year was unparalleled, again appeared in many sections of the State in immense numbers, consuming a large portion of the foliage of the orchards, and thereby greatly impairing the value of the fruit—in its diminished size, imperfect flavor, and tendency to early decay.

A remarkable multiplication of an insect such as we have only occasionally to note, was that of a species closely allied to the above, viz., the forest tent-caterpillar, *Clisiocampa sylvatica*, which occurred in Washington county, N. Y., in the early part of June. In a large hard-maple grove, in the town of Kingsbury, its depredations were seen to an extent never before witnessed by me. In a tract of perhaps ten acres in extent, on the entire north side, where the attack had evidently commenced, the trees, although some of them were two feet in diameter and seventy feet or more in height, had not a single leaf upon them; the green leaf-stalks and portions of the principal ribs alone remaining. The larger limbs, in places, were covered with masses of the caterpillars, as if, after wandering fruitlessly over the leafless trees in search of food, and without an inherited instinct for migration, their social propensities had led them to collect together for sympathy in this their time of need. They were not yet full-grown, and later, no doubt, driven by hunger, they would resume their travel and complete the defoliation of the grove, unless a fungus attack, which was observed, should spread and arrest further ravages.

The usual prevalence of the caterpillar of the white-marked tussock-moth, *Orgyia leucostigma* (Sm.-Abb.), whose operations almost annually so greatly impair the beauty of the foliage of the maple and the horse-chestnut, was not observed by me in Albany or in its vicinity or in other sections of the State visited by me, nor was it reported elsewhere in entomological journals. The conditions of the season may not have been favorable to it; but more probably, it had been subjected to serious parasitic attack the preceding year, as was certainly the case during the present year, for the conspicuous white egg-masses resting on the cocoons, indicating the development of the female and giving promise of future ravages, were of rare occurrence. In a cluster of twenty or more cocoons, not a single egg-deposit, in several instances, was to be seen. The unsightly cotton-bands that many of the citizens of Albany had placed about the trunks of their maples and suffered to remain so long that it seemed as if they were intended to do service for another year, was but labor lost, for they failed to serve their purpose. So far as my observations extended, not a single caterpillar was present on the protected trunks with the intention of surmounting the barrier.

Two instances have been brought to my notice during the year of an extraordinary multiplication of insects which have led them to depart from their accustomed habits and to intrude in large numbers in dwelling-houses, to the serious annoyance and discomfort of the household. One of these was that of the weevil known as *Otiorhynchus ovatus* (Linn.), which, now, for the second year, has invaded many houses in Potsdam, N. Y., to such an extent that aid has been asked in the effort to prevent the invasion. This species had previously displayed in other localities a propensity for entering dwellings, as noticed on page 51 of my Second Report (under the name that it formerly bore of *Otiorhynchus ligneus*), but never before in such remarkable numbers as reported from Potsdam.

The other instance is that of the grain-weevil, *Silvanus Surinamensis* (Linn.), overrunning a house at Catskill, N. Y., but in this case, probably the intrusion is traceable to its origin in the barn or out-buildings not far distant. More extended notice of both of these occurrences are necessarily omitted for the present.

Several other quite interesting insect attacks have come under observation during the year, the investigation of which it was intended to carry sufficiently far for presentation in this report.

This, however, has been prevented by the exactions of a continually increasing correspondence, which has already become almost burdensome; by the time devoted to the supervision of the printing of my report of last year, which had been delayed until the latter part of November; and particularly by the requirement that the present report should be presented to your board at an earlier date than usual, in readiness for printing, and without the privilege heretofore accorded, perhaps improperly, of rearrangement or the subsequent incorporation of additional matter. For these reasons, the insects noticed in this report are principally those which had come under observation in former years, and of which notes were at hand available for present use, being mainly upon those of our more common insect pests, of which inquiries had often been made of the entomologist, and answers returned either by letter or through agricultural and other journals.

In the appendix to this report will be found a list of the contributions to the department made during the year, which, it will be observed, have been somewhat more numerous than usual. Among them is one of more than ordinary value — that of Mr. Erastus Corning, Jr., embracing a number of the beautiful butterflies of South America. Mr. Corning has also donated a portion of a collection in the several orders of insects, made by him during his summer's sojourn at Murray bay, on the St. Lawrence river, Province of Quebec. Unfortunately, the larger portion of the collection was destroyed through careless handling in its transit to Albany, and the present contribution therefore embraces only the minor portion that escaped entire destruction. When arranged, proper record will be made of it.

The appendix also contains a list of the principal publications made by the entomologist — forty in number — during the year, and also those of two former years. The summary of contents with which they are accompanied, give their scope and show if they are desirable to the student for reference. The more important of these which have been communicated to agricultural papers, when rewritten and extended, will find more permanent place in subsequent reports.

With grateful acknowledgement to your honorable board for aid and courtesies extended during the year,

Respectfully submitted.

J. A. LINTNER.

NOTICES OF VARIOUS INSECTS.

Eumenes fraternus Say.

The Fraternal Potter-Wasp.

(Ord. Hymenoptera: Fam. Eumenidæ.)

Eumenes fraterna Say: in Narrative of an Expedition to the Source of St. Peter's River, under the command of Major Stephen H. Long, ii., 1824, p. 344–346.

Examples of the cells of this insect, attached to a grapevine leaf, were sent from Sandy Hill, N. Y.

They are balls of clay of a somewhat irregular surface, of about the size of a common black cherry (six-tenths of an inch in diameter). Examination shows them to have been moulded from separate pellets of clay, of which a dozen or more are recognizable. From some of the additions little nodosities have been left projecting here and there.

One of the balls having been broken *en route*, its character is shown in a thin wall of a smooth, glassy interior surface, as if from the secretion of some glairy substance. The cavity contained no larval remains, but was nearly filled with a yellow, wasp-like pupa, having a large abdomen, constricted somewhat centrally, and much more so at its junction with the thorax.

Description.

On rearing the pupa it gave the fraternal potter-wasp, *Eumenes fraternus*, shown in the accompanying figure. It is of about the size of the common wasp, *Polistes fuscatus* Fabr. It may be recognized by its shining black color, the long petiolated basal joint of the body of about the length of the thorax, extended from its hair-like pedicel in the form of a long-necked bottle; the following joint (second) broadly pear-shaped, with a yellow spot on each side and a yellow border behind; third and fourth joints bordered with white; legs black and yellow; wings smoky.

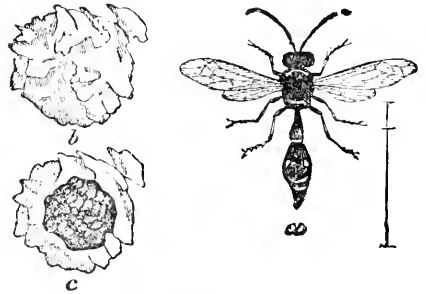

Fig. 1.—The fraternal potter-wasp, Eumenes fraternus, and its cell.

Distribution.

It is quite a common species throughout the Eastern United States. It extends from Canada to Texas, and in its broad range is subject to so great variation that several varieties might be made.

Architecture.

The cells of this wasp, as above described, are to be met with "joined to the upper surface of leaves, or stuck to little branches, or fastened against a wall" (H. de Saussure, in *Synopsis of American Wasps*). Dr. Packard states that they are attached by a short, stout pedicel to bushes; but, according to de Saussure, the cell terminates in a little bell-mouthed neck, which it obliterates after filling. According to Say, the insect constructs for each of its eggs a hollow globe of earth, with a short ascending neck, the rim of which is sometimes widely outspread horizontally. In the examples before me, fastened to the *under* surface of the leaf, one shows the pedicel-like bell-shaped mouth in place, but closed, while the two others show a fracture where the mouth would have been.

Habits.

The provident mother wasp of this species packs the cell to which she consigns her egg with insect food to serve her young until it shall reach its pupal state, when it no longer requires nourishment. Dr. Harris tells us that eighteen or twenty canker-worms are sometimes imprisoned in a cell. It is not, however, confined to this particular caterpillar for food, for other nocturnal lepidoptera have been found within cells that have been opened; and the young larvæ of butterflies have also been seen in possession of the wasp, destined, no doubt, to serve for larval food, as the wasp itself is not carnivorous. At *c* in Figure 1, the interior of a cell is shown packed to its utmost capacity with young canker-worms which had previously been reduced to a stupified and helpless condition, by an amount of poison injected into them in quantity sufficient barely to permit of a continuance of life and prevent decomposition.

Transformation.

About a month is required for the development from the deposit of the egg to the perfect insect, when the thin wall of the cell is easily broken by the wasp for its escape. Examples of the species have been taken by me in various localities in the State of New York from the latter part of July to beyond the middle of August.

Family Characters.

The family of *Eumenidæ*, to which this species belongs, contains those of the true wasps, having their wings folded horizontally, which are solitary in their habits, consisting only of males and females; unlike the neighboring *Vespidæ*, which are composed of males, females, and neuters. Some of them, as in the genus *Odynerus*, in constructing their nests, excavate with their powerful mandibles in sandy banks, in crevices in stone walls, in holes bored in wood by other insects — unlike *Eumenes*, which builds its mud nests in the open air.

Hypoderma bovis (De Geer).

The Ox Warble-Fly.

(Ord. Diptera: Fam. Œstridæ.)

Œstrus bovis Linnæus: Systema Naturæ, 12th edit., ii, 1767, p. 969, No. 1.

In reply to an inquiry received from Watertown, Jefferson county, N. Y., for information regarding the above-named fly, and for the best method for preventing the deposit of its eggs, the following communication was made to the *Country Gentleman*, and published in the issue of June 23, 1887. Since that time, the valuable studies of Miss Ormerod, of England, on this species, particularly in the direction, of late, of the enormous losses resulting from its prevalence, has aroused interest in this country, and important observations have been made upon it. These will not be referred to at the present, as it is understood that the Entomological Division of the Department of Agriculture at Washington, will soon publish the results of their careful and extended investigations of the insect, in which they have been for some time engaged.

Warbles are small tumors occurring in the skin of the back of some animals, caused by the presence and operations of a species of fly in its larval stage, contained within them.

Of these warbles or wurmals (probably derived from worm-holes), several different ones are known, as that of the buffalo, produced by *Hypoderma bonassi* Brauer; of the ox, by *Hypoderma bovis* DeGeer; another species believed to belong to the ox or the sheep, *Hypoderma lineata* Villers; of the reindeer, by *Œdemagena tarandi* (Linn.); and an unnamed species, the larvæ of which were taken from under the skin of the neck of a box turtle, *Cistudo Carolina*, in Massachusetts (*American Naturalist*, 1882, xvi, p. 598, larva figured).

The ox warble-fly, *H. bovis*, is found in both North America and Europe, and is a quite common species. When a large number of the warbles occur in a single animal, its health and condition are seriously impaired, and the value of its hide for conversion into leather greatly depreciated.

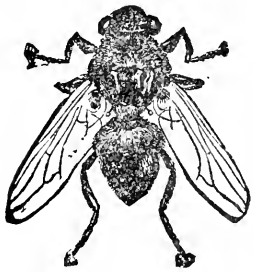

Fig. 2.—The ox warble-fly, Hypoderma bovis, enlarged.

Fig. 3.—The ox warble-fly, natural size.

As very few persons are familiar with the appearance of the fly, or would be able to recognize it, although it might be hovering with evil intent about their cattle, figures of it are herewith presented, accompanied with such description as will enable any one to identify it beyond all doubt whenever it may be encountered. Figure 2 (after Verrill) represents the fly, enlarged, and Figure 3 (after Ormerod) in its natural size.

Description of the Fly.

It will be seen that it measures a little more than half an inch in length. It is heavily covered with hair, except the thorax, which is partially naked, black, and twice broadly banded with white and yellow. The abdomen is also black with a white or yellowish band at its base, a black band over its middle, and a reddish-orange band of hairs at its tip. The head is large, and its front is ash-colored with yellowish-white hairs. The wings have a brown tinge, and are unspotted. The legs are black, with lighter feet. Some writers have compared the fly, in appearance, with a humble bee, its general shape and the yellowish hairs of its body being the points of resemblance.

Life-history.

It has not yet been ascertained how the egg is deposited by the fly, whether simply attached to the skin, or if inserted into it by means of its long, extensile ovipositor, which has been described as gimlet-like. Nearly all the subsequent life-history of the insect has been fully worked out, and for much of our later knowledge of it we are indebted to the earnest and successful labors during the past two years of Miss Eleanor A. Ormerod, Consulting Entomologist of the Royal Agricultural Society of England. The following items in its life-history have been mainly drawn from an illustrated paper on "Warbles," by Miss Ormerod, published in the *Mark Lane Express*, of April 25, 1887:

Evidence of the attack, if the skin be removed, may be discovered on its inner or flesh side early in the winter. Within a small swelling at the lower portion of the hide, the larval insect—"maggot," as it is usually called—very small in size and of a blood-red color, may be discovered lying free at the bottom of a fine channel, shown in Fig. 4, leading down to it, but not traceable to the outer surface. The small swellings develop into "warbles," which are formed with the growth of the larva as early as in February, occasionally in January, and may be found at this time with an open passage leading outwardly on the hide. The larva is white and worm-like in form and appearance. In its next stage of development it is club-shaped, and in its following stage it assumes its well-known shape, with its thick and prickly skin, lying within the warble cell with its membranous walls.*

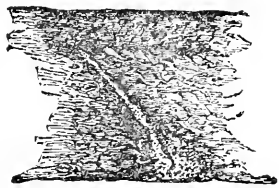

Fig. 4.—Channel made by the ox warble larva through the hide, much enlarged. (After Ormerod.)

Some very interesting changes take place in the pair of spiracles or breathing-pores in which the abdomen of the larva terminates, in that while in their early stage they are elongated and somewhat club-shaped, horny, and adapted to the boring service that they have to render, later they become flat and kidney-shaped disks which undergo two or three subsequent modifications before they attain their final phase.

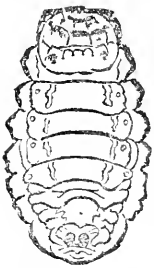

Fig. 5.—The larva enlarged. (After Verrill.)

The larva, at maturity, is shown in Figures 5 and 6. We prefer to call it by its scientific designation, which should be understood by all, rather than by the repulsive name (from association) of "maggot," although the latter properly belongs, in common usage, to the larva of a fly, as that of "grub" does to the corresponding stage of a beetle.

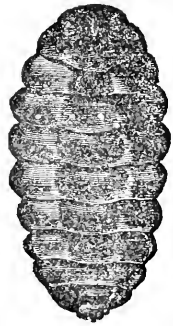

Fig. 6.—The larva enlarged. (After Ormerod.)

At its full growth it is about an inch in length, oval, somewhat flattened, and varying in color from whitish to dark gray. It shows a number of deeply incised segments (ten can easily be distinguished) and many rings of minute spines or prickles, which aid materially the

*For a valuable paper on the larva of this and other species of the family, see a translation from Friedrich Brauer's "Monographie der œstriden," Wien, 1863, contained in *Psyche*, iv, 1885, pp. 305-310.

muscular coating in extrication from the warble and burying for pupation, it being unprovided with feet.

Figure 7 represents a section of the terminal tip of the larva during its boring period, with its pair of spiracles communicating with the two tracheal tubes which traverse the larva, and are seen to be tied together near their origin by a cross-connecting tube.

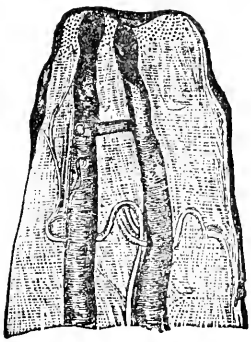

Fig. 7.—The larval breathing-tubes. (After Ormerod.)

The larvæ commence to mature (their development not being uniform) during the month of May, when they crowd themselves out through the hole in the warble, fall to the ground and bury themselves for pupation. The pupal period is of about four weeks' duration, at the expiration of which the fly emerges and makes its appearance abroad, in readiness to deposit its eggs for another brood.

Preventives and Remedies.

From the unequal development of the warble above referred to, the flies continue to appear abroad for quite a long period, viz., during the months of June, July, and August. If preventives of the attack of the fly are to be employed, it will be necessary to apply them from time to time throughout the above-named months.

Of preventives, the following may be mentioned: Dry sulphur rubbed in on the back is recommended. Dressing the back with the McDougall sheep-dip (sold by many druggists in our large cities, and advertised in our agricultural journals by the American agents, F. Porter Thayer & Sons, 104 Chambers street, New York) has proved quite efficient, as has been extensively tested in England. But perhaps a still better preventive may be prepared by mixing one quart of whale-oil soap, one gill of oil of tar, and four ounces of flour of sulphur. Its application is to be made with a brush on both sides of the spine of the animal, once a week during the period of the egg-laying of the fly — June, July, and August, as before stated.

But beyond all question the best (from its being the most simple and the most practicable) method of dealing with the warble insect, is to kill the larva. The efficacy of this method will appear from these facts: The fly seldom wanders to any distance for oviposition, but almost entirely confines its range to the farm where it had its birth; and experience has shown that when careful examination of the cattle

has been made, and the larvæ within the warbles killed, there was nearly an entire exemption from attack the following years.

The warbles are easily to be found during the months of March and April, by passing the hand over the back of the animal on each side of its spine, when, if any are present, they will at once be detected. On examination, an opening will be seen leading into the warble, and closely applied to it, the black-tipped tail of the larva within may be discovered, drawing in the air needed for its sustenance.

The old method has been to postpone all attention to the warbles until the month of May, when their contents can easily be forced out by a gentle pressure with the fingers. But this delay, from the greater irritation produced by the rapid increase in the larval growth, entails much increased suffering upon the infested animal, and consequent detriment to its health and condition.

Careful examination of the stock should be made as early as in February, when opened warbles may often be discovered. As soon as they are found in this stage of advancement, a small quantity of mercurial ointment should be applied to the opening, with such pressure as shall cause it to reach the end of the larva lying against the hole. The larva will be killed by the ointment, and its decomposed material discharged in two or three days thereafter, and the healing of the warble will immediately follow.

It has been stated that if, whenever the presence of warbles can be detected, whether in the autumn or during the winter, mercurial ointment be rubbed upon them, it will be absorbed through the skin, and cause the death of the larva within. Kerosene is said to have the same effect; but we can not vouch for the efficacy of these methods of treatment.

Instead of the above ointment, almost any thick, sticky, greasy matter, such as rancid butter, lard, or cart grease, applied to the warble in such a manner as completely to close the opening, will kill the grub, as its life can only be sustained by the air which it draws through the hole into the breathing pores at the tip of its abdomen. A bit of tar has been successfully used for the purpose.

The Ox Gad-Fly.

Another species of fly infesting the ox, which in the minds of many persons is confounded with the warble-fly, although of very different habits, is the ox gad-fly, *Tabanus bovinus* Linn., represented, after Ormerod, in Figures 7 and 8. This species is mentally associated with a galloping herd of cattle with their tails in mid-air and mouths wide-spread in bellowing, rushing madly over their pastures to find relief in a plunge in water, as has been so often

pictured in English works and in writings drawn from English sources. As much of our knowledge of natural history, not many years ago, was drawn from the above sources, it is not uncommonly believed that we have the same gad-fly in our country; but while there are many species of the *Tabanidæ* which are at times exceedingly annoying to our domestic animals and to ourselves, the *Tabanus bovinus*, fortunately, has not been introduced among us. The species of this family popularly known as "horse-flies" are injurious through the severe bite that the fly inflicts preparatory to, and during the operation of, her blood-sucking. Only the females bite and feed on blood. The larval stage, in many cases, is passed in the ground.

FIG. 8.—The ox gad-fly, TABANUS BOVINUS.

FIG. 9.—The ox gad-fly at rest.

Drosophila sp.

A Flour-paste Fly.

(Ord. DIPTERA: Fam. DROSOPHILIDÆ.)

I send you by mail a package containing larvæ of a little fly, very troublesome around my cellar and pantry. These were taken from some paste that had been set aside for a short time. I could not obtain any of the flies, but presume that they will be produced from the larvæ if they reach you in good condition. They are very partial to anything in a state of fermentation, and if my pickled fruit or jam begins to sour, they find the change in it before I do, and frequently in a short time the entire top of the fruit seems alive with the larvæ, although they never penetrate deeply into the jar. Please tell me the name of the insect, its habits, and history. O., *Susquehanna, Pa.*

The flies have been bred from the larvæ, sent in the paste, and they appear to be a species of *Drosophila*, of which several species are known to be attracted by the odor of fermenting substances. The particular species of this minute fly is unknown to me. The pupa-case is one-tenth of an inch in length, and the perfect insect has a spread of wings of about one-eighth of an inch. Its large thorax and small abdomen are of a dull yellowish color, and under a lens, show a number of long, stout hairs; the wings are beautifully iridescent. These flies are so very small, that they would hardly be noticed in the dim light of pantries and cellars. They are not of the same species with those mentioned above as infesting pickled fruit and jam when commencing to ferment. The latter, if they could

examined, would probably prove to be identical with the species which has bred, by me, from jars of pickled plums — the *Drosophila spelophila*, or "the pickled-fruit fly," for a notice of which, and in further reply to the above inquiries, see the *First Report on the Insects of New York*, 1882, pp. 216–221.

Adalia bipunctata (Linn.).

The Two-spotted Lady-Bird.

(Ord. COLEOPTERA: Fam. COCCINELLIDÆ.)

Coccinella bipunctata LINNÆUS: Syst. Nat., edit. 10, 1758, p. 364, No. 2.

The communication given below is but one of many received which indicate a great need of such additional knowledge of our most common lady-bugs, as shall prevent their being mistaken for the carpet-beetle and sharing the fate justly meted out to that destructive household pest.

I inclose in this a small box containing two specimens of a beetle that has been found in large numbers in many of the dwellings of this city. Those who have suffered from the ravages of the carpet-bug state with great positiveness that the insect inclosed is the beetle from which comes the larva that has been so destructive to carpets, and it appears to be a fact that where great injury has been sustained by the carpet-bug, there these beetles have been found in the greatest abundance. I do not find that the specimens inclosed answer to the descriptions of the carpet-beetle that have been published in the newspapers. Most persons would say that the beetles I send are lady-bugs, and I find the very same insect on plants out of doors. One characteristic of these beetles is, a very disagreeable odor evolved when they are handled or disturbed, and if in numbers the stench is intolerable. Does this peculiarity belong to lady-bugs? Written notices of the carpet-beetle state that in the warm days of March and April, the animals are found in numbers on the windows — such has been the case this spring in houses here. What we term lady-bugs were found crawling in the vicinity of the windows. Can you tell me if the carpet-bug and the lady-bug are identical? H. L. Y., *Poughkeepsie, N. Y.*

The beetles received are the *Adalia bipunctata* (Linn.), one of the "lady-birds." It is a small beetle, of a broadly oval form, having the wing-covers of a dull red color, each one conspicuously marked with a single black spot on its center; the thorax is of a cream color, with an inverted W-shaped black mark; it is shown in Figure 10. So far from being connected with the destructive carpet-bug, it is one of our insect friends, as are, with perhaps two or three exceptions, all of its associated "lady-bugs."

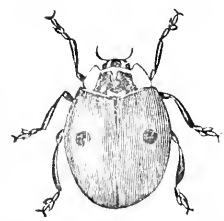

FIG. 10.—The two-spotted lady-bird, ADALIA BIPUNCTATA. (After Emmons.)

Food of the Insect.

This species is one of the most useful of its family — the *Coccinellidæ* — as it is of broad distribution throughout the United States, and occurs on almost any kind of vegetation where plant-lice abound. In its larval stage it is wholly carnivorous, its food consisting to a great extent of plant-lice. In its imago or beetle stage, while largely carnivorous, it is undoubtedly vegetarian in part, as examinations of the stomachs of allied species of *Hippodamia* and *Coccinella* have shown them to be — in some instances their food having been ascertained to consist of from fifty to seventy-five per cent of pollen of *Compositæ* and other plants, and spores of lichens and fungi.*

Its Domestic Habits.

The two-spotted lady-bird passes the winter as a perfect insect, and has the habit belonging to several insects, as notably that of the elm-tree-beetle, *Galeruca xanthomelæna*, of *Otiorhynchus ovatus* (one of the *Curculionidæ*), and of *Chloropisca prolifica*,† of entering dwelling-houses for the purpose of hibernation; but of all the many species of the lady-bugs, of which 141 are recorded in the Henshaw list, this is the only one that possesses this domestic habit. During the winter of 1886–7, following its unusual multiplication as the result of the presence of an unprecedented number of plant-lice in hop-yards and on other crops in the State of New York, it became remarkably abundant in many dwellings.‡

Mistaken for the Carpet-beetle.

When, at the advent of the first warm days of spring, it resumed its activity, it was in many instances believed to be the greatly dreaded carpet-beetle. From many localities in the State examples were sent to me, asking if it was that insect, while in some instances reported to me, it was not thought worth while to make the inquiry, but the harmless creatures were ruthlessly gathered upon dust pans and thrown into the fire. It would hardly seem possible, after all that has been written and published of the lady-bugs and of the carpet-beetle (pictures of the latter have been scattered broadcast over the land

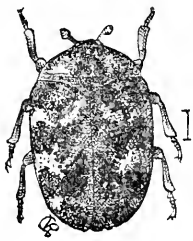

FIG. 11.—The Carpet-beetle, ANTHRENUS SCROPHULARIÆ.

*Forbes: In *Bulletin No. 6 of Illinois St. Lab. of Nat. Hist.*, Jan. 1883, pp. 51–55.

† *Fourth Report on the Insects of New York*, 1888, pp. 67–72.

‡ A gentleman in Boston, Mass., has reported it as a common insect in his house during the winter months, for successive winters. There had seldom been more than two or three days at a time when these lady-bugs had not been seen creeping or flying about the house, invariably coming out and showing activity in his library every evening as soon as the room became warm. At one time during cold weather at least 1,000, as estimated, were on the inside of his front door. (*Insect Life*, i, 1888, p. 56.)

in newspapers), that so criminal a blunder could be made. There is no resemblance between the two in ornamentation (see figure of the carpet-beetle herewith presented), while in size the lady-bug is perhaps eight times the larger in surface.

It is hardly necessary to add to the above that the *Adalia* is entirely harmless in its visits within doors, not feeding in the slightest degree upon woolens, cottons or silks or other fabrics.

Odor of the Beetle.

Its peculiar odor, referred to in the communication from Poughkeepsie, has long been known. It is caused by a yellowish viscid substance, which is thrown out from the joints of the legs, when the insect is taken in the hand, as in the oil-beetles and blister-beetles of *Meloe, Cantharis*, etc., of another family. This secretion, at a time when many insects were employed in medicine, was supposed to possess medicinal properties, and the beetle was recommended, and we believe, used for relief from tooth-ache by crushing its body and placing a portion in the cavity of a decayed tooth.

Dermestes lardarius Linn.

The Bacon Beetle.

(Ord. Coleoptera: Fam. Dermestidæ.)

Dermestes lardarius Linnæus: Faun. Suec., 1st edit., 1746, p. 135, 360; 2d edit., 1761, p. 140, 408.

This common household pest is frequently received for name, with inquiry of its habits and a remedy for its attack. The following is one of the notes of inquiry received:

Inclosed you will find several bugs and larvæ which I found destroying our bacon. Will you please tell me what they are, and if there is any way of preventing their ravages? Our meat was mostly put in heavy meat sacks; some was in muslin lined with paper, and a few pieces were without either. The meat was encased in sacks about the first of March, and hung up in the garret. The sides were free from them although without sacks. If there is a remedy, please let us have it.

The insects sent with the above are "the larder-beetle," or as more generally designated, from its particular fondness for bacon, "the bacon-beetle." They present the following appearance, which is so marked that they may be easily identified:

Description of the Beetle and its Larva.

The beetle is of an oblong-oval form, black, except the basal-half of its wing-covers, which are of a pale buff or brownish-yellow color, within which, on each cover, are (usually) three elongate black spots in an irregular transverse row. The legs are short and the head is bent downward and mostly concealed by the broad thorax. In length it measures three-tenths of an inch. It is shown at *c* in the accompanying figure. The larva which produces the beetle, represented at *a* in the figure, is about a half-inch in length when full-grown, dark-brown above, whitish below, rather thickly covered with brown hairs as long or longer than the greatest breadth of its body; these hairs, when magnified, present a peculiar biserrated appearance, as shown at *b*.

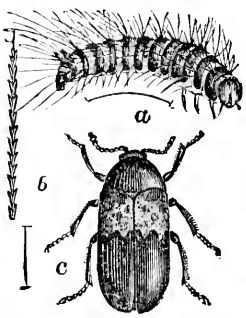

FIG. 12.—The bacon-beetle, DERMESTES LARDARIUS; *a*, the larva, enlarged; *b*, a larval bristle, greatly enlarged; *c*, the beetle.

Introduced from Europe.

The *Dermestes lardarius* was introduced from Europe, where it has been known for over two centuries, many years ago, and is now quite generally distributed over our country. It has become thoroughly naturalized, and is, we should judge from the accounts received, committing greater injuries here than in its old home. Associated with it, and of similar origin, are several other destructive in-door pests, as *Dermestes vulpinus* (figured on page 89 of our Fourth Report), which at one time committed such ravages in the furs of the Hudson's Bay Company in its store-houses in London that a reward of £20,000 was offered for the discovery of a means for effectually destroying it; *Anthrenus scrophulariæ*, the notorious carpet-beetle; *Anthrenus varius*, the pest of insect and other animal collections in natural history; *Attagenus megatoma*, also a carpet-beetle, etc., etc.

Its Food.

Dermestes lardarius is particularly fond, as above stated, of bacon, although it also preys upon other dried meats, as hams, etc., also on cheese, peltry, skins, horns and hoofs of dead animals, feathers, insects in museums, and mounted birds and mammals. Recently it has been discovered as displaying a fondness for beeswax, as will be hereafter noticed. It does not eat clothing of any kind, unless it incloses, or is heavily charged with, fatty animal matter.*

*Mr. Henshaw's statement that wool and silk are among its articles of food, may be presumed to refer to the unmanufactured material.

It is the larva that commits by far the greater depredations, the perfect insect being comparatively harmless, except as it continues the species by the deposit of its eggs. In one instance, however, I have known it to attack and destroy some insects while exposed on the preparing boards.

Its Attack on Bacon.

In the instance in which inquiry is made, where the larvæ were found in bacon hanging in a garret in paper and muslin sacks, the attack may have originated in the deposit of eggs before the meat was sacked, or subsequently through some break or opening in the sacks. In the former case, the larva sent must have been of the second brood, for the time required for the eggs to develop into beetles would not exceed six weeks. The only definite knowledge that we appear to have, in the literature at my command, of the length of time required for any of its stages, is the statement of Dr. Horn,* that "the insect remains in its pupa for a period varying from three to four days to a week or even more, depending principally on the warmth of the locality."

Difficulty of Preventing Attack.

No way is known of preventing attack when meat is exposed where the insect occurs. The only security would seem to be in bagging while free from egg-deposit, in such a manner that the meat shall be protected in bags of such a character or so treated that the young larvæ would not penetrate them to reach their food. Would not this be secured by a thick coating of lime-wash?

It is, therefore, quite important that the appearance of the beetle and of its larva should be known, so that they may be looked for and killed whenever discovered, and their ordinary rapid multiplication by this means prevented. The cast larval skins (exuviæ) which are thrown off from time to time during growth, often disclose the lurking places of the active larvæ, buried within the substance on which they are preying. There are apparently several broods throughout the year, so that meat is liable to attack at any time.

It has been stated recently that when the insect is known to occur in a house, they may be attracted by baits of old cheese, from which they may be gathered and destroyed.

**Proceedings of the Entomological Society of Philadelphia*, i, 1861, p. 28.

Unusual Abundance of the Insect.

The following note from a correspondent at Ridgefield, Conn., shows the multiplication of the beetle to such an extent that relief from its annoyance could only be obtained through persistently collecting and destroying every individual that came under observation:

Will you please tell me what kind of a bug this is that I inclose. I find it wherever I leave any food for a few hours. I also find them in the soiled-clothes basket and in the bureau drawers, where I had put some handkerchiefs partly used. Do they eat clothes, or are they simply scavengers for the clearance up of scraps? What will prevent these bugs from getting into a store basket where groceries for family use are kept?

The Insect as a Wax-feeder.

A beetle sent to me for name, by Mr. John Aspinwall, editor of the *Bee-Keepers' Magazine*, the larvæ of which had attacked some empty honey-comb and riddled the wax, proved to be this species. In the reply made by me, published in the *Bee-Keepers' Magazine* for May, 1888, it was stated: "I have no knowledge of this insect ever attacking honey-comb, nor do I find any reference to such a habit in any publication at hand. Professor Cook has not included it in his list of enemies of the bee, given in his excellent *Manual of the Apiary*. If the suspicions entertained of the larvæ feeding on comb shall be verified, it will be an interesting fact, as indicating a strange extension in its food-habits."

Inquiry was subsequently made of Professor Cook of any knowledge that he might have of the occurrence of *D. lardarius* in bee-hives, to which he made reply that in the last edition of his Manual [not seen by me when above quoted] he has stated that it often feeds on the dead bees and pollen in comb, and so mutilates the fabric.

Inquiry was also made of Dr. Hagen, of the Museum of Comparative Zoölogy, at Cambridge, Mass., if, in the large library of European entomological literature at his command, there was any record of *D. lardarius* feeding on wax or infesting hives in Europe, or if he had knowledge of such occurrence elsewhere. He returned answer that in an extended search through a large number of works, both in the Museum library and in the public library of Boston, he has met with no record of the kind. Mrs. Hagen had recalled the fact that yellow wax was sometimes injured in Europe by insects.

Subsequently to the above correspondence, confirmation was found of the wax-eating of this insect as above reported, in a brief article contained in the *American Entomologist* for June, 1870, vol. ii, p. 246,

previously overlooked by me. The editor, Professor C. V. Riley, in reply to a correspondent from Wisconsin, who had sent examples of the larvæ to him for identification, after giving its name, states: "We never knew them before to occur in bee-hives; but as they feed on feathers, horn, hoof and other (to us) indigestible substances, it is not surprising that they should also relish wax. Those you sent fed ravenously upon it; and after changing their coats several times, became beetles."

The present instance brought to notice by Mr. Aspinwall of *D. lardarius* feeding on wax, is an interesting addition to our knowledge of the insect, for we are now authorized to conclude that the first reported case above quoted, was not, as may have been thought, simply an abnormal manifestation of appetite, but that a larval taste for wax exists which will be gratified whenever the opportunity for so doing offers.

More recently Miss H. A. Heaton, of Charlton, N. Y., in a letter written to the editor of the *Bee-Keeper's Magazine*, under date of September 22, 1888, has related her experience with *D. lardarius* as a honey-comb pest. It is as follows:

I was much interested in the information given in the May Magazine with regard to the bacon beetle attacking comb. For several years I have been troubled with the larvæ of this beetle working in combs used for extracting, but as the combs were used each summer the larvæ were never permitted to injure them greatly. The combs were kept in a shop formerly occupied by a carpenter, and were always put away in the autumn nicely cleaned by the bees of all adhering honey, and with very few, if any dead bees in the cells. When getting them for use the next summer I would strike each frame on the floor and jar the beetles and larvæ out of the comb. No meat of any kind was kept in the building, and they certainly seemed to thrive on their food — wax or pollen — for they were large and healthy larvæ.

Agrilus ruficollis (Fabr.).

The Raspberry Gouty-gall Beetle.

(Ord. Coleoptera: Fam. Buprestidæ.)

Buprestis ruficollis Fabricius: Mantissa Insectorum, i, 1787, p. 184, No. 85.

To an inquiry from St. Joseph's, Mich., of the stage in which the insect that causes the irregular swellings on the raspberry canes passes the winter, and for such other information as would aid in arresting its injuries, the following reply was made:

This particular deformation of the raspberry cane is known as the raspberry gouty-gall. Its architect lives through the winter. It is the larva of one of the *Buprestidæ* beetles, which was described by Fabricius a century ago, under the specific name of *ruficollis*, referring to the coppery-red color of its thorax. It is now known as *Agrilus ruficollis* (Fabr.). From the history of its transformations as traced by Prof. Riley, we learn that the eggs of the beetle are deposited in the growing canes of the raspberry and blackberry during the months of July or August. The larvæ which soon hatch therefrom pass into the sap-wood and burrow through it in an obliquely transverse direction, producing the irregular swellings during the period of the flow of the sap, shown in the figure, and eventually killing the cane, through girdling it, especially when several larvæ unite in their operations within one of these elongated galls. The larvæ are often killed in northerly latitudes by the winter's cold, but if they survive, early in the spring — April or May — when they have nearly attained their growth, they penetrate into the pith, where they undergo their pupal transformation, and the perfect beetles emerge during June and July, to couple and deposit the eggs for another brood.

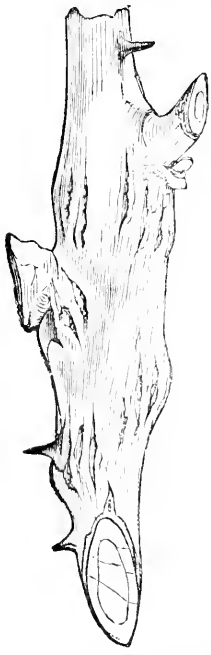

Fig. 13. — The raspberry gouty-gall of Agrilus ruficollis. (After Riley.)

Remedy.

The above knowledge of the history of this pest places within our hands an easy method of controlling its injuries. It is only necessary to make thorough search for the gouty canes during the winter and early spring, and to cut them out and burn them; and to the extent that this work is done, to the same extent will future depredations be prevented.

Distribution.

This insect seems not to prove very injurious in the northern portion of the United States. Although included in the entomological reports of Canada, it does not definitely appear that it occurs there. I have taken it rarely in the State of New York. The examples in my collection bear date of capture of July thirtieth.

Literature.

For additional information of the insect, some of the following publications may be referred to:

Amer. Quart. Journ. Agricul.-Sci., iv, 1846, p. 300 (description and figure of beetle).

Report U. S. Dept. Agriculture for 1868, p. 92 (figure, and habits of allied species); ib., for 1870, p. 67 (figures, etc.).

American Entomologist, ii, 1870, pp. 103, 128, figs. 68, 69, 90 (transformations); ib., iii, 1880, pp. 91-92, figs. 27, 28.

Ann. Report Entomolog. Soc. Ontario, for 1873, p. 8 (figure, etc.).

Sixth Report Insects of Illinois, 1877, p. 114 (description of larva and beetle).

Insects Injurious to Fruits.—Saunders, 1883, pp. 307, 308, figs. 316-318.

Coptocycla aurichalcea (Fabr.).

The Golden Tortoise-Beetle.

(Ord. COLEOPTERA: Fam. CHRYSOMELIDÆ.)

Cassida aurichalcea FABRICIUS: Syst. Eleuth., i, 1801, p. 397, No. 53.

Inclosed please find some little golden beetles which are found on sweet potato vines. They are so destructive that plaster has been dusted over the vines to drive them away. They appear to be *Chrysomelidæ*, but I have been unable to identify them.

The beetle, of which the above inquiry is made by a correspondent from Philadelphia, Pa., belongs to the *Chrysomelidæ*, and is at present known by the common and scientific names above given. When alive, their brilliant coloring, like a piece of gold leaf, makes them one of our most beautiful insects. Its brilliancy varies greatly with its emotions, it is thought, and disappears with its death. They are, however, very injurious to the sweet potato vine, which is their favorite food-plant; they also occur on the bitter-sweet, morning-glory, and different species of *Convolvulus*. The eggs are laid singly on the leaves of the larval food-plant, and are somewhat unusual in form, being angular and flattened, with some spinous appendages.

The Larva.

The larva is a peculiar looking creature. It is broadly oval, rather flat, about one-fourth of an inch long when full-grown, its body is dark brown with a paler shade on the back, margined with a range of stiff branching spines, and terminating in a long forked tail,

which it utilizes by bending it over its back and supporting upon it a protective covering or mantle composed of its excrementa and exuviæ, to shield it from the sun or to hide it from its enemies.

Excellent illustrations of the larva and beetle are given in the *American Entomologist* i, 1869, p. 237, figs. 177, 178.

The beetle was observed in abundance on the morning-glory, at Kaatskill Bay, on Lake George, N. Y., on the twenty-sixth of June — many in copulation, and in great resplendence.

The Clubbed Tortoise-Beetle.

Coptocycla clavata (Fabr.).

(Ord. Coleoptera: Fam. Chrysomelidæ.)

Cassida clavata Fabricius: Supp. Syst. Ent. 1798, p. 83, No. 30–1.

Can you give me any information concerning the inclosed curious-looking insects, which appear to be quite new in this locality? I have found them in isolated cases feeding upon the leaves of the potato, egg-plant, and tomato during this season and last. F. T.
Morristown, N. J.

The curious-looking insects (received in small fragments from unprotected inclosure in a letter) belong to the group of tortoise-beetles and to the species at present known as *Coptocycla clavata*. By some authors it is placed in the genus *Deloyala* Chevr., and by older authors was included in the genus *Cassida*.

The beetle, shown in Figure 14, is less than one-fourth of an inch long, of a broadly oval and flattened form, and with the thorax and wing-covers thinly spread out on their margins — their upper portions pitted and rough, of a brown color, marked with black on the more elevated parts. The upturned margin of the thorax is whitish and transparent, as are also the margins of the wing-covers, except at four points where the brown of the dorsum extends to the margin, viz., at the apex and just before the posterior tip. This species is not known to be particularly injurious to the potato plant, although it has at times been found in considerable numbers upon it in different localities, as at Old Westbury, Long Island, N. Y., but was not reported as doing serious damage. In addition to the tomato and egg-plant, as above stated, it also occurs upon the bittersweet (*Solanum dulcamara*). It is somewhat singular that this species does

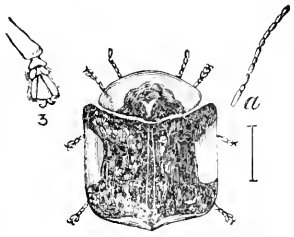

Fig. 14.—The clubbed tortoise-beetle, Coptocycla clavata. (After Emmons.)

not, so far as known, attack the sweet-potato and the morning-glory, both of which are quite attractive to the other species of this genus, *Coptocycla aurichalcea* (Fabr.), and *C. guttata* (Oliv.), and also to *Cassida nigripes* Oliv., and *Cassida bivittata* Say.

Both the larvæ and the perfect insects of the tortoise-beetles feed upon the plants on which they are found.

The larval *Coptocycla clavata* possesses the same habit with its congenor, *C. aurichalcea*, of concealing or protecting itself beneath an excremental covering borne on the flexible anal horns over its back.

The early stages of this species have not, so far as we know, been described or observed, owing, probably, to its comparative rarity, or to its not possessing special economic importance.

Bruchus scutellaris Fabr.

A Pea-Weevil.

(Ord. COLEOPTERA: Fam. BRUCHIDÆ.)

Bruchus scutellaris FABRICIUS: Entomologia Systematica, Tome I, Pars ii, 1792, p. 372, 14.

I send you to-day some specimens of a pea-weevil that seems to differ considerably from the common pea-weevil, *Bruchus pisi*. Last year I raised a crop of the Southern black-fallow pea. This spring the larger part was used for seed, and no weevils or holes in the peas were observed. About three bushels were put into a bag of loose, open texture, remaining in it all summer. A few days ago [latter part of November] the bag was covered with weevils, and upon examining the peas they were found to be hot,* pierced with holes and alive with the little beetles. Is this a true pea-weevil, or a kind that attack peas in the granary? G. C.

BRUCKNER'S STATION, VA.

Description of the Weevil.

The weevil is quite different in general appearance, when closely examined, from the well-known "pea-bug," *Bruchus pisi* Linn., and is hardly more than one-half the size, for while that species measures 0.20 inch in length, this is only from 0.12 to 0.16 inch. Its principal colorational features are these: The wing-covers (elytra) are brownish or ferruginous, black at the tip and with a large black spot resting on the outer margin at the middle and reaching nearly to the inner margin — the two connected with black along the outer margin and

* See notice by Mr. L. O. Howard, in *Insect Life*, i, 1888, p. 59, on "Heat evolved from the work of a Bruchus" [*scutellaris*] — overlooked until the proof-reading of the above.

with white scales between them. The end of the abdomen (pygidium) has a whitish line along its middle and a large dark-brown spot on each side thereof.

It may be separated structurally from *B. pisi* from its belonging to a group of seven described United States species, as indicated by Dr. Horn in his "Revision of the Bruchidæ of the United States," in which the hind thigh (femur) is toothed on both the inner and outer sides, while the *B. pisi* and *B. rufimanus* group is characterized by a femoral tooth on the outer side only.

Its Literature.

The original description of the species was by Fabricius in his *Entomologia Systematica*, as above cited. A detailed description of it may be found in Dr. Horn's Revision above cited, in the *Transactions of the American Entomological Society*, iv, 1873, p. 317. It was originally described as an European species, but with a number of others of the *Bruchidæ*, it has been introduced through commerce into the United States, and into most of the civilized countries of the globe. At the Centennial Exhibition, at Philadelphia, it was discovered by Drs. LeConte and Horn in beans received from Venezuela, S. A., as appears in their "Report on Insects introduced by means of the International Exhibition."

Its Probable Life-history.

The life-history and habits of this pea-weevil would be about the same as those of the common species, *Bruchus pisi;* its eggs, like that, being deposited on the newly formed pod, and the young larvæ when hatched penetrating the pod and entering into the young peas, to feed therein and to mature after the gathering of the crop. The pea-bug does not deposit its eggs on ripened and dried peas in granaries, nor could its larva penetrate their tough rind and burrow into the hard, dry substance. The statement made by our correspondent is a strange one, and we can not offer a satisfactory explanation of it. The bugs should, in accordance with the habits of their kind, have emerged from the peas in the spring of the year following the crop. They often appear before the time of planting, but not always so if kept in a cold place and planted early; and therefore, if these were the attendant conditions it might be expected that the three bushels that were bagged would give no evidence, at the time, of their being infested, particularly if such attack was not expected and no careful examination of condition made. But that, passing their ordinary time for emerging, they should make their escape and show themselves on the outside of the bag (of an "open texture" permitting their

escape) during the month of November (the living specimens were received about the middle of that month) seems to me quite remarkable. When the appearance of an imago that ordinarily requires a winter for its development, is delayed beyond its normal time in the following spring, as is not unfrequently the case with beetles, moths, etc., it is usually extended to the spring of the year thereafter, when the growing plant is in readiness for oviposition and for larval food. Such prolongation of the larval or pupal stages may, at times, serve for the continuance of the species in view of possible unfavorable conditions intervening, but a prolongation such as we interpret that related by our correspondent, would seem to be necessarily fatal to the entire delayed brood.

Remedies.

Any of the remedies named for *Bruchus pisi* would, of course, be equally efficient for this species. The following method, given by a correspondent of the *New England Homestead*, might be convenient where a large quantity of infested peas or beans are to be treated.

Take a large box — a common dry goods box will do — and line it air tight with tin, leaving a round hole with a cover eight or ten inches across. Put the beans or peas into this box through the hole, and into a box that will hold eighteen to twenty-five bushels put half a pound of chloroform, by pouring it on a cloth and shoving the cloth down to the bottom with a stick. Then put on the cover tight and let them stand five or ten days. This will kill all the grubs of the weevil, which are in the beans. After this, you can sack up your beans and have no more trouble from the weevil. The chloroform leaves not the slightest taste or smell in the peas or beans, and the cost need not be over two or three cents per bushel. I have been using the above recipe for the last twenty years and my peas always come out beautiful, and keep so if they are put in at once and as soon as they can be threshed.

Hymenorus obscurus (Say).

A Bark Beetle.

(Ord. COLEOPTERA: Fam. CISTELIDÆ.)

Cistela obscura SAY: in Journal of the Academy of Natural Sciences, of Philadelphia, v, 1826, p. 242.

I have a young orchard of some four or five hundred apple-trees just coming into full bearing, of select fruit. Part of these I noticed last season showed signs of disease, the leaves turning quite yellow, which at that time I attributed to the then prevailing drouth. I notice that it is extending farther in the orchard this season, and is cause for alarm. Upon investigation for the cause, I find the inclosed beetles, which are secreted under the old bark, and where found their abrasions extend to the wood, and a stain or discoloration as if caused

by a flow of sap, and in the immediate vicinity an entire absence of vitality of the bark. On one of the trees examined, the bark is entirely dead for eight or ten inches above ground to the roots, around three-quarters, or seven-eighths of the tree, and presents the appearance of being rotted by water. In my extremity I have determined to apply soft soap to the body, with the hope of arresting the ravages of the insect, until I can obtain farther light. If my explanation is sufficiently lucid to enable you to form an opinion of the character of the evil existing, please furnish a remedy which will arrest it.

J. W. M.

PERROWVILLE, VA.

The insects inclosed are bark beetles, and belong to the tribal group of which the larvæ occur under the bark, or in the decayed wood of trees which have long been dead. The perfect insects are generally found in the same situations, but occasionally they leave their natural abode, and may be captured abroad upon leaves and flowers, as is the habit of the family of *Cistelidæ*, to which the beetles sent belong. Thus *Cistela sericea* is said to be very common on flowers in Maryland in late summer and autumn.

The species submitted for identification, and for which a remedy is asked, is the *Hymenorus obscurus* (Say). There is no record of its being injurious to apple trees or to any other living vegetation, and as the *Cistelidæ* are not known to be obnoxious species, it does not seem at all probable, notwithstanding the suspicious circumstances under which it was found, that it can have been the cause of the injuries to the trees. In all probability the death of the bark for the large space near the roots above mentioned, from some unknown cause, first invited the deposit of the eggs of the beetle, as the decaying wood offered suitable food for the larvæ. These subsequently transformed to the perfect insect in the cavities where they were found, and when, of course, under such circumstances, they could do no harm. Some other cause for the impaired condition of the trees must be sought — perhaps other than insect attack. — *Country Gentleman.*

Meloe angusticollis Say.

The Oil-Beetle.

(Ord. COLEOPTERA: Fam. MELOIDÆ.)

Meloe angusticollis SAY: in Journ. Acad. Nat. Sci. Phila., iii, 1824, p. 280.

Some insects feeding on buttercups and also observed on clover were received from Perry, N. Y., with a request for their name and habits.

Description of the Beetle.

The insect, shown in the accompanying figure, is a soft-bodied beetle, three-fourths of an inch in length, of a glossy, dark-blue color, with a large ovate body, short, small, overlapping elytra, without wings, with long legs, the head heart-shaped, abruptly narrowed behind into a neck and bent downward, having the antennæ rather short, twisted and larger in the central joints in the male. Its scientific name is *Meloe angusticollis* Say.

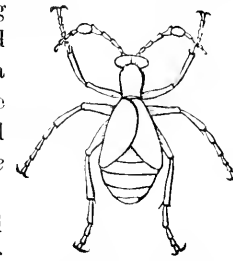

Fig. 15.—The oil-beetle, Meloe angusticollis, male.

The female is distinguishable by its antennal joints of nearly uniform diameter, its broader head, and its egg-shaped abdomen before oviposition so swollen with its burden of eggs that it can with difficulty be trailed over the ground. It is considerably larger than the male, measuring nearly an inch in length.

Habits.

This strange-looking insect is popularly known as the oil-beetle, from a peculiarity which it has, when disturbed, of throwing out from the joints of its legs a thick, oily, yellowish fluid of a disagreeable smell, which is said to contain uric acid. It is an interesting species, from the singular habits and transformations of its larva. The eggs are deposited in the ground, probably in the vicinity of bees' nests, whence when hatched, the young larvæ, called *triungulins*, transfer themselves to the bodies of the bees, wasps, etc., and feed upon their juices. They also have been found living as parasites on various flower-flies and on some other Diptera. Their transformation is quite exceptional, in that instead of passing directly from the larva to the pupa, and then to the imago, as do other Coleoptera, exclusive of the blister-beetles, the second larva enters into a quiet stage in which it is known as the pseudo-pupa. It then passes into its third larval stage, in which it is active but does not feed, and afterward enters its pupal stage, thus existing in eight distinct states, counting the egg and the beetle.

The beetle possesses vesicating properties and is numbered among the blister-beetles. It has been employed as a substitute for the Spanish fly (*Cantharis vesicatoria*) of the shops and is said to be almost as powerful in its effects.

The oil-beetle is frequently met with in May, and again in August and September on buttercups (*Ranunculus*), and is also found creeping slowly over grasses and on the ground.

Epicauta vittata (Fabr.).

The Striped Blister-Beetle.

(Ord. COLEOPTERA: Fam. MELOIDÆ.)

Lytta vittata FABRICIUS: Systema Entomologiæ, 1775, p. 260, No. 3.

The following communication under date of July sixteenth was received from a correspondent in Prospectville, Pa.:

Providentially, no doubt, aided considerably by incessant hard work in sprinkling with Paris-green and plaster of Paris, we have at last got rid of the Colorado-beetle (for this season at least) without much damage to our potato vines. In their place some old acquaintances have put in their appearance by millions, which were here about six years ago when they destroyed the mangold beet, and carrot crops. They have now taken the place of the Colorado beetles on the potatoes, and are equally as ravenous as the young beetles. They are easily driven off by sprinkling the vines with fine lime or plaster of Paris. There is no necessity of wasting Paris green on them, as they will not eat the leaves when dusted. I have driven them away in former years by simply lashing the vines with a cart whip or a hickory brush, driving them out of the field in regular armies, but the most certain way is to promptly dust the vines. As I do not know the name of this insect, I inclose one for a name and description.

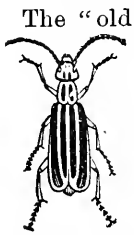

FIG. 16.—The striped blister-beetle, EPICAUTA VITTATA.

The "old acquaintances" which are reappearing in immense numbers after a long interval are the striped blister-beetle, *Epicauta vittata* (Fabr.). It is a southern species not very often injurious in the State of New York, so far as my observations extend; occurring rarely in New England, according to Dr. Harris; sometimes in Canada, as stated by Mr. Saunders; but abundantly northward and westward of the Carolinas, extending to the foot of the Rocky mountains.

Food Plants and Voracity.

The beetle feeds upon a number of garden vegetables, but manifests a preference for the leaves of potatoes and tomatoes. They often make their appearance very suddenly, and have been known to defoliate large potato patches in two or three days. So serious often are their ravages upon potato vines that before the advent of the *Doryphora decemlineata*, it was frequently referred to as "the potato beetle," and Dr. Thomas, in the *Ninth Report on the Insects of Illinois*, cites it as the "old-fashioned potato-beetle." In the year 1880 it was unusually prevalent in the State of New York. Examples were sent to me from Bethlehem, Albany county, with the statement that it had

destroyed a garden in a single night, eating potatoes, beet-leaves, corn, etc. In 1887, it was received (Aug. 1) from Morton, Pa., where large numbers had collected upon a *Clematis flammula* and completely devoured its leaves, as also of another *Clematis* with similar but not fragrant flowers. It will thus be seen that its ravages are by no means confined to potatoes.

Remedies, Etc.

Perhaps the best preventive of the depredations of this insect when not very numerous is collecting by hand or by brushing them from their food-plants into broad vessels and destroying them. A large tin pan with some kerosene in the bottom would be convenient for the purpose.

It is stated in the *American Entomologist* (i. 1868, p. 24) that in seasons when they have swarmed on the potato vines in Ohio, their injuries were arrested "by placing between the furrows or rows some dry hay or straw and setting it on fire. The beetles were thus nearly all destroyed, and the straw burning very quickly did not injure the vines." The driving and dusting methods practiced by our correspondent, may also be employed with good effect. It is fortunate that there is only a single annual brood of these greedy pests, unlike the successive broods of the Colorado potato-beetle.

A Valuable Vesicant.

This insect, as its common name indicates, belongs to the family of the blistering beetles (*Meloidæ*), and is said by Mr. Wm. Saunders, who is excellent authority on the subject, to possess blistering properties *fully equal* to the well-known Spanish fly, *Cantharis vesicatoria* Linn.

Its Transformations.

The transformations of the *Meloidæ* have been studied with great interest by naturalists, and for a long time with very little success. Some of them were known in their early stages to be parasitic upon honey bees, attaching themselves to them by first climbing upon flowers, and passing from thence to the bees visiting the flowers. Others were believed to live in the ground and feed upon the roots of vegetables.

In an admirable paper published in 1877, by Professor Riley, "On the Larval Characters and Habits of the Blister-beetles," we were for the first time made acquainted with the life-history of some of the species, and among them that of the striped blister-beetle. The eggs are laid from July to October, in large masses, in holes excavated by the female in the ground, which she afterwards covers by scratching

with her feet. The places usually selected for their deposit are those in which grasshopper eggs abound. Hatching in about ten days they come to the surface, and may be seen running actively around, closely scanning every crevice for the concealed eggs. Having found one of the grasshopper egg-pods, it at once burrows into it, first devouring a portion of the shell of an egg, and then its contents. Nourished by the eggs, it undergoes three larval changes, when it leaves its food and constructs for itself a cell in the ground, where two additional larval changes are passed through before it assumes the pupa state. Its final transformation to the beetle follows a brief pupation of five or six days, making the eighth distinct form under which it has appeared. In the vicinity of St. Louis, where Professor Riley studied these transformations, the insect displayed a marked preference for the eggs of the grasshopper, known as *Caloptenus differentialis*.

Characteristic Features.

Those who are acquainted with our more common blister-beetles may readily separate the *E. vittata* from the others by its ovoid head of a reddish color, with black spots; its narrower thorax, longer than broad, having its greatest width behind, of a black color, and with three dull yellow lines (or of a yellow color with two black lines); its abdomen also broader and thicker behind, with black wing-covers margined with dull yellow and traversed by a yellow stripe. The antennæ, legs, and body beneath, are black, the latter covered with a grayish down. Its length is from five-tenths to six-tenths of an inch. The general appearance of the insect is shown in Figure 16, after Riley.

Epicauta cinerea (Forster).

The Margined Blister-Beetle.

(Ord. Coleoptera: Fam. Meloidæ.)

Meloe cinerea Forster: Nov. Spec. Ins., Cent. Prim., 1771, p. 62.

Mr. J. J. Thomas, of Union Springs, N. Y., under date of August thirtieth, submitted some beetles received from Mr. W. B. Whitmore, of Canton, Cherokee county, Ga., who desired to know what they were and the mode of meeting them.

It was stated in the communication accompanying, that "this is their first appearance in the locality, and that they are quite destructive to tomato plants. Attention is first drawn to them by the bare stems of the plants, upon which not a leaf is left. They are timid and drop to the ground when attempts are made to capture

them. They are very voracious and usually complete their work before they are discovered. They remain only about a week."

The insect is the ash-grey blister-beetle, *Epicauta cinerea* (Forst.), represented in Figure 17. It was formerly known as *Lytta marginata* Fabr., the margined blister-beetle, from the conspicuous margin of ash-colored hairs bordering the black wing-covers. The head, thorax, under side of the body and legs are covered with gray hairs. This insect, in the perfect stage, is usually found feeding on certain wild plants. It often occurs on the potato, and sometimes in injurious numbers. It might naturally be expected to attack the tomato, but I have no recollection of its having before been reported as depredating injuriously upon this plant. Other species of Epicauta feed readily on the potato, and may therefore be found hereafter on the tomato.

Fig. 17.—The margined blister-beetle, Epicauta cinerea.

E. cinerea is a common species throughout the Eastern, Middle, and Western States, extending over a large portion of the United States.

Epicauta Pennsylvanica (De Geer).

The Black Blister-beetle.

(Ord. Coleoptera: Fam. Meloidæ.)

Meloe Pennsylvanica De Geer: Mem. serv. Hist. Ins., v. 1775, p. 5, No. 16.

A package received from Baltimore, Md., contained the following note of insect injury and inquiry for means of arrest:

I send you by mail a box containing some black bugs which lately have appeared in very large numbers in my garden, feeding upon the cabbages and carrots, to which for the present they seem to confine themselves. They wholly strip the leaves of the carrots, leaving the bare ribs of the leaf. What are they and what would you propose for their destruction?

The insect is the black blister-beetle, whose scientific name is given above. It is identical with the species known until recently as *Lytta atrata* Fabr. Its color is black throughout, being entirely destitute of the colors, spots, or stripes of the other species. Its size is also less than that of *E. vittata* or *E. cinerea*, measuring only from four to five-tenths of an inch in length.

Its Food.

It often occurs in destructive numbers in potato fields, and may commonly be met with during the month of September on the flowers of the various golden-rods, to which it is attracted for food. It also visits china-asters and other flowers. Prof. E. S. Goff, of the Wisconsin Agricultural Experiment Station, has sent it to me as feeding,

in August, on the common annual garden pink, *Dianthus Heddewigii.* I have found it abundantly at Wilmington, in the Adirondack mountains, N. Y., on the flowers of a wild mustard, *Brassica nigra.*

According to Professor Forbes, in August of 1885, it was very common in corn-fields in Illinois, associated with *E. cinerea* and *E. vittata,* all of which were feeding freely upon the fresh silk of corn, doing a very considerable mischief by preventing the fertilization of the kernel and partially blighting the ear. Occasionally *E. Pennsylvanica* was seen eating the kernels at the top of the ear. Professor Goff has also reported it as eating off the tip end of the young ears, in Wisconsin.

This is the first time that I have heard of its attacking either the cabbage or the carrot, and upon referring to all the notices of this species at my command, I do not find either included among its food-plants.

Remedies.

The remedy usually employed against its ravages is to beat them from the plants into a hand-basin containing some kerosene and water. As in attempting to beat them from the plants many may fall within the leaves and be held there, I would suggest dusting the plants with pyrethrum powder. Some quite successful experiments have been made with this powder upon the beetle, at Ithaca, N. Y., as narrated in the *American Entomologist,* iii, 1880, p. 193.

Numbers of them were rapidly defoliating a passion-flower vine, when upon applying the powder they were immediately affected, as was shown by vigorous efforts to remove the substance from their legs. In three minutes they were unable to walk. The vine was completely freed from the attack for a week, until after a rain, when a few of the beetles again appeared. The pyrethrum does not kill at once, but paralyzes the beetles and renders them helpless, until they finally die.

Pomphopœa Sayi LeConte.

Lytta Sayi LeConte: in Proc. Acad. Nat. Sci., Phila., June, 1853, vi, p. 336.

This blister-beetle is much less common than the preceding ones, but in June, 1885, it occurred in great numbers at Frankfort, Herkimer county, N. Y., where it was observed by Mr. A. Casler feeding on wheat, the leaves of the butternut and on locust blossoms, continuing for about a week, during the latter part of the month. Although a collector of insects, the species had never come under his observation before. It had been taken by me, in single examples, at Schoharie, N. Y., during the month of June, in preceding years.

Podisus spinosus (Dallas).

The Spined Soldier-bug.

(Ord. Hemiptera: Fam. Pentatomidæ.)

Arma spinosa Dallas: List Hemip. Br. Mus., i, 1851, p. 98, 7.

I mail with this note a box containing three specimens of an insect which has recently appeared as a destroyer of the Colorado potato-beetle. At first the farmers mistook them for an additional damage to the crop, and were dismayed, but investigation revealed them as a blessing. They are very voracious, and destroy a vast number of larvæ and bugs in the larval or soft state, which is the time when they most injure the vines. The inclosed insects were confined under a glass for about an hour with six fully grown pupæ, when, unfolding a slender proboscis, they fastened it to some portion of the bug, following it about as it attempted to escape, never for an instant relaxing their hold till their bug was dead. They are so very lively that I was obliged to inclose them in cotton to prevent their escape, that they may reach you alive. If Eastern potato growers are so overwhelmed with potato bugs as Western farmers have been, it would not seem a whimsical idea to import some of these destroyers to their devastated fields.

F. T.

Carbon Cliff, Ill.

The insect accompanying the above interesting communication, is recognized as one of our most efficient allies in the contest with the Colorado potato-beetle, viz., *Podisus spinosus* (Dallas); or, as it has been properly named from a spine which projects from its thorax on each side, and from its bold, soldier-like habit of attack, "the spined soldier-bug." It is a true bug, belonging to the order of *Hemiptera*, among which are numerous species which render us valuable service in preying upon our injurious insects, after the manner above described. It is shown in Figure 18. The suggestion of the importation of this parasite, is one which could easily be carried into effect, and which should be done were it not that it is already an inhabitant of the Atlantic States, and of common occurrence (as also over a large portion of the United States), and has long since entered upon, and continued to prosecute, its valuable work in the reduction of the number of the Colorado potato-beetle as well as many other insect pests, as cut-worms, the caterpillars of other Lepidoptera, etc.

a *b*

Fig. 18.—Podisus spinosus (Dallas). *a*, the beak or proboscis enlarged; *b*, the insect with one wing extended.

Prionidus cristatus (Linn.).*

The Nine-pronged Wheel-bug.

(Ord. Hemiptera: Fam. Reduvidæ.)

Cimex cristatus Linnæus: in Amoen. Acad., vi, 1763, p. 399, 42; Cent. Ins. rar. 1763, p. 16, 42.

A number of peculiar-looking insects surrounding the eggs from which they had apparently but recently emerged, were received for indication of name, habits, and food, from Burlington, N. J., where they had been found on a "copper beech"—a variety of the European beech, *Fagus sylvatica*, having a crimson purple foliage.

They were true bugs of the order of Hemiptera (Heteroptera), and belonging to the family of *Reduvidæ*. They were quite young, being

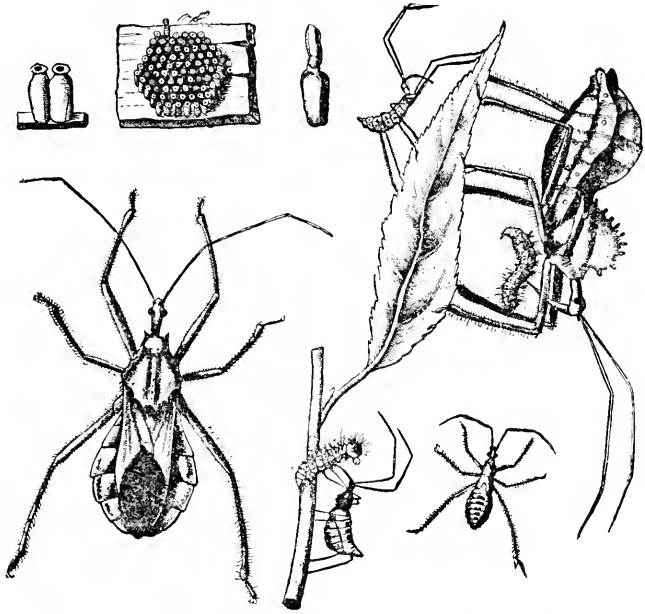

Fig. 19.—The nine-pronged wheel-bug, Prionidus cristatus, in its young and mature forms; also, its hexagonal egg-mass, eggs enlarged to show their flask-shape, and an egg giving out the larva.

in their first larval stage. As at this period the members of this and allied groups differ greatly from their mature forms, I was unable to refer them positively to the "wheel-bug," *Prionidus cristatus* (Linn.), but without much doubt they were of that species. The eggs from which

*Mr. Uhler, in his *Check-list of the Hemiptera-Heteroptera of North America*, has proposed for this species the generic name of *Prionidus*, on the ground that the *Prionotus*, of Laporte, is preoccupied.

they had escaped, correspond closely with the description and figures given of those of the "wheel-bug." They are arranged side by side, on end, in a hexagonal cluster of about sixty, each one shaped like a short flask, somewhat compressed on the four sides, and opening for the escape of the larva by a rounded cover with a central depression. The young larvæ are queer looking spider-like creatures, with their long legs and antennæ, and the body, when distended with food, several times broader than the head and thorax. The abdomen is red, while all the other portions of the insect, except the orange terminal joint of the antennæ, are of a shining black.

In the figure given, *P., cristatus* is illustrated in its several stages. The flask-shaped eggs are shown in enlargement (one with the insect escaping from it) and in their natural size as arranged in a cluster. The larvæ are given in different attitudes and in feeding, and the mature insect (enlarged about one-half) in a dorsal and side view.

A Carnivorous Insect.

The insect is one of those which may claim our protection wherever met with, as it renders valuable service in the destruction of large numbers of injurious insects, especially, in its younger stages, of aphides or plant lice. As with its increase in size it acquires additional strength, it preys upon caterpillars, chrysalids, and does not hesitate to attack other insects several times larger than itself. While gregarious in the early larval stage, they will readily feed upon one another, as was shown in the examples sent me, of which, although they were furnished with a liberal supply of aphides, there are at the present time of writing but two survivors, which for security have been given separate apartments.

A Combat.

The caution, persistence, courage, and ferocity which these young creatures display in capturing and subduing their larger prey is surprising and exceedingly interesting to observe. As a test of their power I had given to one of the larvæ a pupa of the rose-leaf tyer, *Penthina nimbatana* (Clemens) — perhaps fifteen times its own size. Its approach to its victim was by an imperceptible movement; not a foot was lifted, although the intervening space could be seen gradually to lessen; only the antennæ were observed in slow motion. When with its hinder legs holding to the side of the box, its front prehensile limbs had glided over and upon the body of the pupa, an attempt was made, apparently, to insert therein the tip of its formidable three-jointed proboscis. A sudden and violent contortion

of the pupa threw it off, but not into retreat. Its front legs were slightly withdrawn, but still in position just above the writhing body, in readiness to descend, as they did, with the same imperceptible movement as before, as soon as the alarm of the attacked pupa had subsided into quiet. Again, the touch of the beak compelled a temporary withdrawal, through the twisting of the abdominal pupal joints. Time and again — perhaps fifty times — was this performance repeated during the two hours, nearly, of the continuance of the contest, when it was finally ended, not, as I had expected, by the burying of the long beak securely within the body of its victim, but by the daintiest insertion of its extreme tip (hardly more than a simple contact) in one of the wing-covers, and the probable transmission of a poison that speedily arrested further struggles. The richly-earned repast that followed was an ample one, for in ten minutes the abdomen of the bug had expanded into at least ten times its previous size.

Stinging Power.

While the natural habits of these insects are not of an injurious character, they may not with safety be taken into the hand. With their robust and needle-pointed beak, they are capable of penetrating the flesh and inflicting a painful and annoying wound. It is related that the pain resulting, on one occasion, from a wound of this wheel-bug could only be alleviated by repeated ammoniacal applications, and that the subsequent sloughing off of the flesh a few days thereafter, left quite a cavity in the hand.

The two larvæ referred to as sole survivors of a large company, were accidently killed a short time before they were in readiness for their final molting.

Its Predaceous Habits.

The following communication received from Maryland relating to *Prionidus cristatus*, gives some interesting particulars of its predaceous habits, and of the appearance that the insect would present to the general observer:

We have been familiar for several years with a species of parasitic insect that seems to prey specially upon the tent caterpillar, being so voracious in its appetite that a very few of them will clean out quite a large nest of these pests. I have not the name at hand, but it is well known to naturalists, and is commonly called the "Devil's Horse."

It has a black or dark body and legs, with a powerful pair of mandibles for holding its prey, and an abdomen of an orange to a red color, standing out at an angle of 45° above the rest of the body. To-day I find a new insect, to me at least, eating these, or rather sucking them out and leaving nothing but the dark frame and legs.

The new insect is more of a yellow color shaded to dark orange at the extremity, has six legs, two long feelers, and is provided with a proboscis as long as its body, through which it draws its food. It is one-half inch long; the body and head are on a curve, forming nearly a half circle; the eyes quite large and dark, in a slender yellow head.

It is a new thing to me to see one parasite thus destroying another, but it may not be so to naturalists.

The box contained the larval form of *P. cristatus* and several skins apparently of the same species, which may have been the skins cast off at the molting of the insect, or the dried remains from which the juices had been sucked by individuals of its own species.

That insect parasites and cannibals prey upon one another is no new thing in science; it is simply in obedience to a common law in nature. The cannibal propensity of the "devil's horse" (or as it is perhaps more commonly named, the nine-pronged wheel-bug, from the nine prominent teeth with which its thoracic crest is armed), in both its larval and perfect states, has long been known. If several of them are confined in a box, with no other food, they will invariably destroy one another, by sucking out the juices, until only a single one will be found remaining.

The "new insect," above described, was probably a larva of the *P. cristatus*, which, having passed through several moltings, differed in appearance from the insect less advanced, upon which it was discovered feeding.

Pulvinaria innumerabilis (Rathvon).

The Maple-tree Scale-insect.

(Ord. Hemiptera: Subord. Homoptera: Fam. Coccidæ.)

Coccus innumerabilis Rathvon: in Pennsylvania Farm Journal, iv. August, 1854, pp. 256–258.

The above-named scale-insect is one of the largest of its kind, and is so conspicuous from the white, cottony mass that it secretes, that it often comes under observation and arouses interest in its character and habits.

It is frequently found infesting grapevines, and to grape growers it is known as the grapevine scale-insect; but it more often occurs on the maple, particularly the soft maple, *Acer dasycarpum*. To an inquiry from Parkersburg, Va., under date of June eighteenth, for information of the insect which was infesting, to an alarming extent, the maple shade trees of the vicinity, the following reply, in substance, was made:

The Scale.

The specimens sent, attached irregularly to the lower surface of maple leaves, about twenty on each, are white, cottony masses of from three to nearly four-tenths of an inch long, about one-half as broad, of a suboval form, bearing upon the narrower end a scale, somewhat flattened down, which is darker marginally, oval, broader posteriorly, where it is excavated and apparently cleft for a short distance on the median line; in front is a medial carina for about one-fourth or one-third the length, some granulations on each side, usually five transverse wrinkles or folds and about the same number of raised lines running outwardly on each side to the hinder margin.

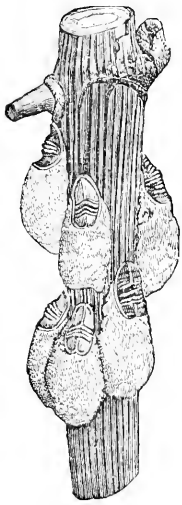

FIG. 20. — The maple-tree scale-insect, PULVINARIA INNUMERABILIS.

The white cotton-like mass which in the later stage of the female existence, is so conspicuous a feature of it, is a secretion thrown out for the protection of its eggs, and the newly-hatched insects.

This insect belongs to the *Coccidæ*, or as more commonly known, scale-insects. Its common name, drawn from the tree upon which it more frequently occurs, is the maple-tree scale-insect.

History.

The species was first described by Dr. Rathvon, of Lancaster, Pa., in the year 1854, who found it occurring "in such countless millions" upon some linden trees, that he gave it the name of *Coccus innumerabilis*. A few months thereafter (in 1855) Dr. Fitch received examples of it from an osage orange hedge in Ohio, and deeming it identical with a fig-tree *Lecanium* of Europe, the *L. caricæ* of Fabricius, he simply described and figured it, with the remark that if it should prove to be a new species, it might be known as *Lecanium macluræ* — the specific name (suggested by Mr. Kennicott, from whom the examples came), taken from the plant on which it occurred.* In the year 1860, the species again came under the notice of Dr. Fitch, as infesting maples at Albany and vicinity, and not recognizing it as the osage orange insect, he proposed for it the name of *Lecanium acericorticis*. In 1868 it was received by Messrs. Walsh and Riley as infesting maples and also as occurring on osage orange, and was described

*See summary of Dr. Fitch's paper on this insect in *First Report on the Insects of N. Y.* 1882, p. 301.

by them as two distinct species under the names of *Lecanium acericola* and *L. maclurœ*.

Although marked differences have been pointed out in the several forms named above, they are believed by those who have most closely studied them, to be the same species with that first described by Dr. Rathvon, and now known as *Pulvinaria innumerabilis*.

Food-plants.

While a number of our scale insects appear to be either confined to a single plant or limited to closely allied species, this scale insect, from some peculiar adaptation to varied conditions, has quite an extensive range, having been reported as found on maple, box-elder, osage orange, linden, locust, sumach, beech, willow, grape, currant, and rose. Possibly some of these may prove to be distinct forms. It was found by me on the Virginia creeper, *Ampelopsis quinquefolia*, at Tivoli, N. Y., on June 11th of the present year, the eggs giving out their young five days thereafter.

Life-history.

The life-history of this and of other scale insects are full of interest, but they can not be briefly given, and therefore those who desire to become acquainted with them should refer to some of the many papers in which they have been treated at length. This particular species has been the subject of an elaborate paper of some fifty pages and two plates, by the late J. Duncan Putnam, of the Davenport [Iowa] Academy of Natural Sciences, which, from the extremely careful study of which it is the result, may justly serve as a model for similar biological work.

For the scientific study of the family, reference may be had to a "Report on Scale Insects," by Professor J. H. Comstock, contained in the *Annual Report of the Commissioner of Agriculture*, for the year 1880 (pp. 276–349, plates iii–xxii). A second report on the same insects, in continuation of Professor Comstock's special study while Entomologist to the U. S. Department of Agriculture, is published in the "Second Annual Report of the Cornell University Experiment Station." It is devoted to one of the sub-families of the *Coccidæ*, viz., the *Diaspinæ*, and treats of 121 species, a number of which are for the first time described. In addition to these, nearly fifty species of other North American *Coccidæ* are noticed.

Remedies.

As the scale-insects when they abound are exceedingly injurious to the vegetation that they attack, it is of great importance that all who

are liable to suffer from their injuries should know how they may best be destroyed. Although serious pests, they are not beyond control if the proper remedies are resorted to.

When scale-insects are discovered infesting a few trees in an orchard, or are confined to a quite limited locality, the trees containing them should be cut down and burned at once, as the best way to arrest the spread of the evil.

The species that attack only the trunks and larger branches of shade and other trees, may often be destroyed by scrubbing with a stiff brush, wet with strong soap-suds.

When the foliage is infested, a garden syringe or a force-pump must be employed for spraying the insecticide used. The two best insecticides for the purpose are soap and kerosene. The first has been thoroughly tested in many experiments made by, or under the direction of, Professor Comstock, and is strongly recommended by him, to be used in the following manner: In a gallon of hot water one-fourth of a pound of whale-oil soap is dissolved, and its application is made at a temperature of about 100° Fahr. It should be repeated after an interval of a few days. As the result of other experiments subsequently made, it is stated that one pound of concentrated lye to one gallon of water, will effectually destroy all scale insects, drying up the scales and the eggs beneath them, and killing the young insects if hatched. It is asserted, however, by Professor Riley, that whale-oil soap and lye both fail to kill the eggs of scale-insects, and he therefore urges the use of kerosene as greatly superior to them, and decidedly preferable to any other known substance for the eradication of these pests.

The most simple way to apply the kerosene is to mix it with water, for undiluted it is destructive to many kinds of vegetation, while not affecting others. As it separates quite quickly from the water — in less than a half-minute — it requires to be kept in constant agitation, which may be done by discharging the syringe or pump several times into the vessel before applying the liquid to the trees, and continuing to alternate the discharge from the tree to the vessel.

The Kerosene Emulsion.— But, by far, the best way in which to use, with perfect safety, kerosene for insecticidal purposes, is to make an emulsion of it with some substance that will bring it into the desired condition. Milk was first employed, but subsequently it was found that soap was preferable, from several considerations, such as cost, convenience, permanency, etc. The method of preparing this emulsion has been repeatedly given in entomological publications and agricultural

journals, but perhaps in consideration of its efficacy, it can not be too often repeated. Briefly stated, in a simple sentence, it is this: The emulsion is produced by violently agitating through the nozzle of a force-pump until emulsified in a homogeneous mass, two gallons of kerosene combined with one gallon of a hot soap solution, made by dissolving a half-pound of common soap in a gallon of water. The ordinary dilution of the emulsion for general use is one part of the emulsion to nine parts of water.

As quite an amount of labor attends the production of the emulsion, it would seem to be desirable that the "kerosene butter," as it has been called, should be manufactured in quantity and placed in the market for sale as are a number of other insecticides of far less merit. Its cost of production is so slight that the price at which it could be offered and command, we believe, a ready and extensive sale, could not fail of yielding a large profit to the enterprising manufacturer who would undertake to bring it properly before the agricultural community.

As a Grapevine Pest.

As previously stated, this insect frequently occurs on grapevines. It was received by me from a gentleman in Essex county, Mass., with the following note:

I send you to-day a piece of grapevine cane with several cocoons, as they appear to be, upon it; and a few grape leaves with a different but similar cocoon on them. The vines are under glass, but the specimens were taken from different houses. I have never seen such before and do not know whether they belong to a friendly or injurious insect. Will you please give me some information regarding them.

As the reply made contained some items not given in the above notice, portions of it are herewith presented.

The pieces of vine and accompanying leaves are infested by a pernicious enemy of the grape — the *Pulvinaria innumerabilis* (Rathvon). It is one of the obnoxious family of *Coccidæ* (subfamily of *Lecaninæ*), nearly all of which possess remarkable powers of multiplication, and eventually, if left to themselves, increasing until they nearly or quite cover the surface of the plant or tree on which they occur. When they have become so numerous as this they cause the death of the plant, as their nourishment is drawn from the juices by means of a proboscis inserted through the bark.

In the examples received, the milk-white cotton-like mass that protruded from one end and the sides of the brown suboval scale,

presented three or four times the surface of the scale. Within it were contained the numerous eggs of the mother scale insect.

About the first of July the young lice were developed from these masses and spread themselves over the jar in which the twigs had been placed, appearing as myriads of minute ochreous-yellow atoms; too small to disclose any structure to the unaided eye. These, under natural conditions, would have distributed themselves over the vine and soon have become stationary by attaching themselves to the bark by their proboscis, gradually increasing in size until the following summer, when they (the females) would present the appearance of these large scales raised at one end by the cotton-like substance thrown out from beneath.

The scales attached to the vine, in the examples received were of the usual dark-brown color, while those which occurred upon the leaves, and apparently of the same species, were of a dull yellow-green, approaching in color to that of the surface on which they were placed and on the under side of the leaves only. At the present time these latter, from their peculiar color, can hardly be distinguished from the cotton-like mass beneath them.

This insect has been thought by some to be one of our many imported pests, as but slight differences have been discovered between the European species known as *Pulvinaria vitis*, but it is now generally accepted as distinct. It is so great a pest that every pains should be taken to eradicate it as soon as its presence is detected. The leaves infested by it should be plucked and destroyed, and all the scales scraped from the vines whenever they are observed. In the very young stage of the insect (occurring at the present time — the first week in July) the greater part of the new brood can be killed by going over the infested portions of the vine with a stiff, thickly set, bristle brush, as in their early state they are quite tender and can be easily crushed. Spraying with a weak solution of carbolic acid, before the young are protected by their scales, would also destroy them. A strong soap solution is often sufficient for killing them at this stage. Later, when the scale has become fully formed and fastened to the vine, it would be necessary to use the kerosene emulsion or a strong alkaline wash.

Bibliography.

In a notice of this insect communicated to the *Country Gentleman* for July 5, 1883, most of which has been included in this article, some of its literature is given. As possibly affording some facilities for reference, it is presented here, without addition of omissions or of

later publications, which there is not the time at the present writing to collate.

Coccus innumerabilis Rathvon: in Pennsylvania Farm Journal, Aug., 1854, iv, pp. 256–258, with figure.

Lecanium caricæ Fitch: in Country Gentleman for Jan. 18, 1855, v, p. 38, with figure.

Lecanium acericorticis Fitch: in Trans. N. Y. State Agricul. Society for 1859, xix, 1860, pp. 775, 776.

Coccus aceris Leidy: Report to the Council of Philadelphia on Insects Injurious to Shade Trees, 1862, pp. 7, 8 (erroneous determination).

Lecanium acericola Walsh-Riley: in American Entomologist, i, 1869, p. 14, fig. 8*a*.

Lecanium macluræ Walsh-Riley: in ib., fig. 8*b*.

Lecanium acerella Rathvon: in Lancaster Farmer, July, 1878, viii, pp. 101, 102.

Lecanium acericola. Thomas: in Prairie Farmer for July 22, 1876.

Lecanium acericola. Putnam: in Proceedings Davenport Acad. Nat. Sci., i, 1876, p. 37; in Davenport Daily Gazette, for June 5, 1877; in Transactions Iowa Horticultural Society for 1877, xii, 1878, pp. 317–324.

Lecanium acericorticis. Glover: in Report Commissioner of Agriculture for 1876 (1870), p. 44, No. 53.

Lecanium acericola. E. A. Smith: in Prairie Farmer for March 2, 1878; in 7th Report Insects Illinois, 1878, pp. 120–131, figures.

Lecanium acericola. Lintner: in Count. Gent. for July 4, 1875, p. 425.

Pulvinaria innumerabilis. Putnam: in Proceedings Davenport Acad. Nat. Sci., ii, 1879, pp. 293–346, pls. 12, 13.

Pulvinaria innumerabilis. Comstock: in 2d Report Cornell University Experiment Station, 1883, p. 137.

Aphis brassicæ (Linn.).

The Cabbage Aphis.

(Ord. Hemiptera: Subord. Homoptera: Fam. Aphididæ.)

Aphis brassicæ Linnæus: Systema Naturæ, 12 edit., ii, 1767, p. 734, No. 12.

The following note relating to perhaps the most common and injurious plant-louse known to the vegetable garden, was received from a correspondent in Laceyville, Ohio:

Inclosed I send you a piece of a leaf from a rutabaga turnip. The insects, like those on the leaf, attacked my crop of turnips when the bulbs were about one-fourth grown, and arrested further growth.

The tops are now nearly destroyed, and the crop almost a failure. I tried dusting with plaster, but it did no good. Please tell me what this is, and if there is any remedy.

When going after the turnip leaf, I crossed a young apple orchard, and cut the inclosed twig from one of the trees. Many of the trees were infested in the same way. H. L.

The insects on the piece of turnip-leaf are a species of plant-louse known as *Aphis brassicæ* Linn., figures of which are herewith given. It is an European species, and probably was imported to this country at the time of, or soon after, the introduction of the cabbage. Both in Europe and America it has proved to be exceedingly destructive to the cabbage, although usually it fails, through the reduction made upon its numbers by its enemies, to entirely destroy the crop. Occasionally entire fields have been ruined by its unusual abundance. Its fondness for the rutabaga turnip has long been known, and its injurious operations to the crop, similar to that above stated, have frequently been recorded.

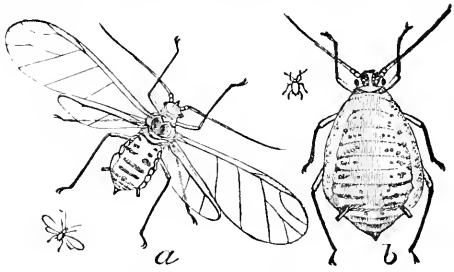

Fig. 21.—The winged and wingless viviporous females of the cabbage aphis. Aphis brassicæ.

The aphides received are of various sizes, indicating old and young individuals. Among them are a few winged specimens, apparently females. These have been minutely described by Dr. Fitch in his 11th Report on the Insects of New York, contained in the Transactions of the New York State Agricultural Society for 1886, vol. xxvi, to which reference may be made. The young are egg-shaped, of a dull pale green color, and looking as if dusted with a grayish powder. Their attennæ and legs are blackish; a row of small black dots may in some be seen along each side of the back.

Remedies.

Lime thrown over the infested plants would prove more serviceable than plaster. Sprinkling with soap-suds is also recommended, but will seldom kill the older aphides. Probably the greatest benefit would be derived from the use of tobacco water — about a pound of tobacco to a gallon of hot water — the better if the water be applied when quite warm. Pyrethrum powder, or a kerosene emulsion, would also destroy all that could be reached by them. Unfortunately, congregating as they do usually, on the under side of the leaves, it is difficult to reach them by ordinary applications.

Apple-tree Aphis.

The insects on the apple twig are the common, destructive, and widespread apple-tree aphis, the *Aphis mali* Fabr., and is almost always to be found upon the leaves or twigs of our apple trees, but more particularly at the time of the starting of the buds and unfolding of the leaves in early spring. Its injuries to the tender vegetation at such time are known to all.

Gryllotalpa borealis (Burm.).

The Mole Cricket.

(Ord. Orthoptera: Fam. Gryllidæ.)

Burmeister: Handbuch der Entomologie, ii, 1838, p. 740.

The mole-cricket, which has received its name from its mole-like operations within the ground, does not often come under observation, but as it occurs abundantly in some localities and is then the occasion of quite an amount of unsuspected injury, it is desirable that its habits and character should be known.

The communication relating to it below is from Woodbury, N. J.:

I herewith mail a specimen of an insect for identification. It is evidently quite plentiful about here but is seldom seen. It burrows in the ground, and from its hiding place makes a noise similar to the note of the common cricket. It also seems perfectly at home when put in water, swimming and diving with great facility. When alive the thorax is at least one-third the length of the whole body, which presents a brilliant velvety appearance throughout. Will you please give name and characteristics.

Description.

The northern mole-cricket, distributed over most of the United States east of the Rocky mountains, "is about one inch and a quarter in length, of a bay or fawn color, and covered with a very short and velvet-like down. The wing-covers are not half the length of the abdomen, and the wings are also short, their tips, when folded, extending only about one-eighth of an inch beyond the wing-covers. The fore-legs are admirably adapted for digging, being very short, broad, and strong, and the shanks (tibiæ), which are excessively broad, flat, and three-sided, have the lower side divided by deep notches into four finger-like projections that give to this part very much the appearance and the power of the hand of the mole." (Harris). The feet of the front pair of legs are nearly concealed and quite peculiar in structure. They are attached to the outside of the shanks and are three-jointed; the first is large, flattened, excavated, claw-like, and curved; the second is similar in form, but less than one-third the size; the third is quite small, oval and bears two terminal, slender, nearly straight claws. The insect is represented in Figure 22 in its natural size.

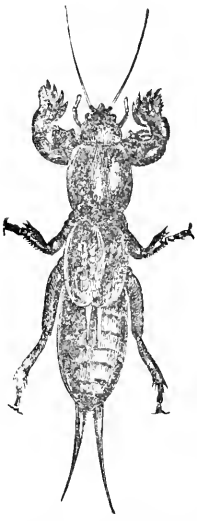

Fig. 22.—The Mole cricket, Gryllotalpa borealis.

Habits.

Our mole-cricket lives in the ground, usually in moist earth — often on the sides of ponds or small streams, where it burrows into the moist ground at a depth of from six to eight inches, by means of its front pair of legs which are admirably constructed for digging. Its eggs are laid in these galleries, in a tough sac, to the number of from two to three hundred, within a chamber scooped out for the purpose. Here it feeds on such roots of plants as may come within its way. Occasionally these crickets occur in large numbers, when they may become very injurious, destroying grass and garden vegetables, and in one instance they are said to have nearly ruined an entire crop of potatoes. They are nocturnal in their habits, sometimes leaving their burrows at night to come abroad, and, in the larger-winged species, disport in short flights. They are believed to partake occasionally of animal food, as of worms and the smaller insects and even of one another, if pressed by hunger. The female is said, at times, to consume large numbers of her young. Their chirp differs from that of other crickets, in being a dull, interrupted, jarring sound, which has been compared to that of the goat-sucker.

The song of the male during the warm nights of early summer has been described as "a low, continued, rather pleasant trill, quite similar to that of the common toad, but more shrill." Mr. S. H. Scudder has written at some length of "The Chirp of the Mole-cricket," in Psyche, for October, 1875, i, p. 105-6. He has written its notes, and has described them as "a gutteral sound, like *grŭ* or *grēēu* repeated in a trill indefinitely, but seldom for more than two or three minutes, and often for a less time. It is pitched at two octaves above middle C. * * * The note sounds exceedingly like the distant croak of toads (*Bufo*) at spawning season, but is somewhat fuller."

The ability and readiness of our species to swim in water has not, so far as I know, been recorded of it. It has also the ability of moving backwards in its burrows with great facility, which must be a great convenience to it in constructing and in traversing its narrow galleries.

Remedies.

In Europe, where the species are far greater pests than in this country, to the extent that they are regarded as "the greatest enemy the gardener has to contend with" in certain localities in Germany and elsewhere, various means have been recommended for the suppression of their ravages, among which are the following: Pouring water into their burrows first and then a few drops of oil, to stop their respiration; burying small garden pots containing a little oil of turpentine, covered so as to keep out the earth, to

kill with the vapor or drive away by the scent; destroying the eggs in June and July by following up the winding burrows, and digging up the nests. A method recommended by Kollar and approved by Curtis, as probably the best where the insect abounds, is to dig pits in the ground in the autumn, of a foot in diameter and two or three feet deep, to be filled with horse-dung and covered with earth. At the first frost, all the crickets will be attracted to and congregate in these pits for warmth, where they can be conveniently killed.

Other Species.

Gryllotalpa longipennis Scudder, is a less common species, occasionally found in New York and Massachusetts, and more frequently in some of the Southern States. Dr. Thomas has recorded it from Arkansas.

Gryllotalpa Columbia Scudder, is cited by Prof. Fernald in his "Orthoptera of New England," as differing only from *G. borealis* in its larger size and comparatively greater breadth of wing-cover. Its habitat is given as Massachusetts, Maryland, and Washington, D. C.

The common mole-cricket of Europe is the *Gryllotalpa vulgaris* — broadly disseminated and very destructive. Curtis' *Farm Insects* may be consulted for its life-history and other interesting particulars of it.

Melanoplus femur-rubrum (De Geer).

The Red-legged Grasshopper.

(Ord. ORTHOPTERA: Fam. ACRIDIDÆ.)

Acridium femur-rubrum DE GEER: Mémoires pour servir a l'histoire des Insectes — Orthoptera, iii, 1773, p. 498, pl. xlii, fig. 5.

The communication given below, received from Brentsville, Va., in July, 1877, records an instance of unusual multiplication and to an injurious extent, of one of our common Eastern locusts, which is so seldom the cause of notable harm to the agriculturist, that each occurrence of the kind is deserving of record. A still more remarkable instance of this occasional multiplication, is that of *Melanoplus atlanis* (a species so closely allied to *M. femur-rubrum* that it has only recently been separated from it by Professor Riley) in the Merrimac valley, New Hampshire, in the years 1882 and 1883, as recorded by Professor Riley in his annual report to the Department of Agriculture for the year 1883 (pp. 170–180, pl. 2) — the Department having been appealed to for aid, if it might be given, in suppressing its ravages:

I send you specimens of grasshoppers, which are very destructive in this immediate neighborhood the present season. The pests were first discovered about the tenth of May, on low meadow-land subject

to overflow. They were at that time not more than one-eighth to one-fourth of an inch long, and then of a rather dark or muddy-green color; a large portion of them changing to a yellow and brown-yellow color as they grew. At the present time, most of them are one to two inches long. Are they the common meadow grasshopper or a new species? I want information as to whether the same locality or place is likely to be overrun and eaten by them another year, or for a series of years?

They are very numerous; have totally eaten up hundreds of acres of meadow and pasture, and have done considerable damage to corn and oats. They have eaten eighty acres of meadow so closely for me, that I shall not be able to get one wagon-load of hay. They spread off the low ground, after consuming the grass, to the higher portions of the meadows, and thence to other fields.

The grasshoppers are the common red-legged species known to science as *Melanoplus femur-rubrum* (De Geer), illustration of which is given in Figure 23. It has an extensive distribution throughout the United States ranging from the Atlantic to the Pacific coasts, and from British Columbia to Florida and Mexico. East of the Mississippi it occurs more commonly and numerously than any other locust. It is closely allied to the destructive species of the Western States — *Melanoplus spretus* — for the investigation of the history of which, and the discovery of means for controlling its ravages, an entomological commission was appointed by Congress in the year 1877, and its results published in two large octavo volumes. The two are so much alike that it is thought that they may eventually be accepted as the same species under local modifications — being alike in coloration, and differing mainly in the length of their wings, and form of the terminal segment.

FIG. 23. — The red-legged locust, *Melanoplus femur-rubrum*.

The ravages of our common eastern species have at times, especially in New England, approximated in certain localities, to those of the dreaded *M. spretus* of the west. It is quite as voracious — feeding upon every green thing, not excepting tobacco, burdock, etc., and even consuming clothing, and the rough outer surface of pine boards. It occasionally becomes migratory, collecting in clouds, rising high in the air, and taking long flights. Fortunately, it is of very rare occurrence that they appear in such numbers, as the several conditions needed for their excessive multiplication are seldom combined.

It by no means follows that a district of country suffering under their visitation the present year, will be infested to the same extent the coming year; it is within the range of possibility that it may be followed by an unusual exemption from attack. The grasshoppers,

when the period for the deposit of their eggs shall arrive, may be in such an enfeebled condition from want of a proper supply of food or other causes, that the eggs deposited by them will lack the vitality necessary to their safe hibernation, or may be eaten by the predaceous insects or mites that often prey upon them; or the young larvæ, while still tender and delicate in the spring, may be largely destroyed by unusual frosts or severe rains.

In what has been above written, the insects have been called *grasshoppers*, in accordance with a popular usage, which it would be futile to attempt to change. Strictly speaking, they are not grasshoppers, but true *locusts*, and it would be well if we would earnestly endeavor to correct in ourselves and in our children the misnomer which has obtained such general currency. It need not make confusion with the *seventeen-year locust*, for that has no valid claim to the name of locust, but is a "cicada."

This species is the *Acridium femur-rubrum* of Dr. Harris, Dr. Fitch, and other early writers. Later, it was known as *Caloptenus femur-rubrum*. In 1873, Dr. Stal, in consideration of structural differences, separated this species and its allied forms from *Caloptenus* of Serville, under the name of *Melanoplus*. This has been accepted by Mr. Scudder (see his "Remarks on Caloptenus and Melanoplus, with a notice of the Species found in New England," in his Entomological Notes, vi, contained in Proc. Bost. Soc. Nat. Hist., xix, 1878, pp. 40–45), and has also been followed in recent publications of Professors Riley, Comstock, Fernald, and others.

Some Apple-tree Insects.

I am an amateur fruit-grower and trying to learn all that I can about the insects which injure apple trees. Inclosed you will find two specimens of larvæ found under the bark of my apple trees. The bark is loose and dead in strips from one to six inches wide and from six inches to two or three feet high, on the trunks of the trees. At first glance one might think it to be sun-scald, but these places are sometimes found where the sun does not shine, and it seems to me that an insect eats the alburnum, or the inner bark. The larva No. 1, inclosed, I find in large quantities on the trees, under this dead bark. None are larger than this, but many are smaller; some just hatched. The smaller ones are of a darker color than this, and slimy like a snail without a shell. What I think are the eggs, are like very small drops of dew piled up in a jelly-like mass. I wish all the information about them that you think may be of use to me. If they have not injured the trees, can you tell me what has injured them, and how they should be treated? The orchard has been set about twenty years.

Specimen No. 2, I think, is the larva of the codling-moth, as I find them on different parts of the tree, under the rough bark. Am I mistaken? There are some flat-headed borers at work on my trees, but they seem to be confined to the ends of the small limbs nearest the ground. The ends of the limbs are invariably dead, and the borer is generally found in the dead wood. I have never found the young borer in the green wood. Does the borer kill the end of the limb, or does it only occur here because the wood is rotten, or the bark easy to get under? I am cutting off all these dead tips, and hauling them out to be burned. In the spring I intend to wash the trunks of the trees and the large limbs with the carbolic acid wash recommended by Mr. M. B. Bateham, page 535, in the volume of the *Country Gentleman* for 1876 [also in 2d Report on the Insects of New York, 1885, p. 25]. Am I doing the right thing? With 2,000 trees to care for, you will see that it will be no small job.

W. E. G.

Carrollton, Ky.

The larvæ found under the bark are footless maggot-like worms, about three-eighths of an inch long by one-eighth broad, quite pointed in front when the very small head and extensile anterior segments are extended; rounded behind, with a short cylindrical terminal projection. The two larvæ sent are apparently of the same species, but in different stages of growth — one having two lateral rows of short spines, and the other being destitute of them. They are probably larvæ of some species of fly, of which, in this stage, I have no knowledge. From the known habits of the larvæ of the Diptera, it does not seem at all probable that these could have occasioned the separation of the bark. After the injury had occurred, the eggs may have been deposited where the proper conditions were found for the sustenance and development of the young larvæ. If additional examples of these forms — the more advanced ones — can be sent in a living state, the perfect insect can perhaps be bred from them. Their occurrence in large numbers under the above conditions is of considerable interest.

Specimen No. 2, is, as supposed, the larva of the codling-moth, *Carpocapsa pomonella.*

The occurrence of the flat-headed borer (*Chrysobothris femorata*) in the ends of the small limbs of apple-trees is quite new to me, for I can find no mention of it in the writings of any of our economic entomologists. Its habitat has heretofore been given as in the trunks and larger limbs of apple-trees. It is not at all improbable that this form is a distinct species from *C. femorata*, and with different habits. And, indeed, the large numbers of very different trees upon which *C. femorata* is stated to occur, leads us to believe that we are confound-

ing several species. Among the food-plants given for it are mountain-ash, linden, box-elder, beech, plum, pear, cherry, peach, apple, oak, hickory, and soft maple. Whether or not Mr. Henshaw is correct in citing in his Check list of Coleoptera and supplement, six varieties and two synonyms of *C. femorata*, could best be ascertained by rearing the larvæ and carefully studying their habits and modes of occurrence. I would be glad to receive specimens of the larva in the terminal ends of the branches, taken from the trees in the month of April next, for verification of its determination as the "flat-headed borer."

The carbolic acid wash referred to gives promise of being of benefit, and it is very desirable that it should be thoroughly tested, and the result reported.

NOTICES OF ARACHNIDA.

Ixodes bovis (Riley).

The Cattle Tick.

(Ord. Arachnoidea: Fam. Ixodidæ.)

Ixodes bovis Riley: in Spec. Rept. Comm. Dept. Agricul., on Diseases of Cattle, 1871, p. 118.

I send you a sample of lice, or ticks, that are found on cattle that have died in several localities in Bucks and Montgomery counties. Will you please give a name for them, their mode of propagation, how and where propagated, and, if practicable, also a method for killing them.

J. M.

Carversville, Pa.

The ticks are the *Ixodes bovis* of Riley, which frequently infests horned cattle, and occasionally other animals, in the Southern and Western States, particularly in Texas, whence it is sometimes known as "the Texas cattle-tick." When received they were gorged with blood, and their bodies distended to an immense size (for a mite), the largest measuring five-tenths of an inch in length by four-tenths of an inch in diameter, as shown in the upper part of Figure 24. Soon after their reception, they deposited large masses of minute, rounded, translucent, brown eggs to the number of hundreds, from a single individual. From these the young will probably soon be produced, perhaps in four or five weeks, judging from the development of allied species. They will have but six legs, while in the adult form the number is eight. When mature, they are flattened, leathery, reddish, seed-like forms, with an oblong-oval body and long legs, as shown in figure.

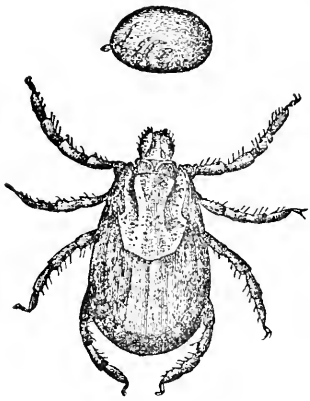

Fig. 24.—The cattle-tick, Ixodes bovis. (After Packard.)

Description.

The mature insect is described as follows by Dr. Packard, in the "Annual Report of the Peabody Academy of Science," April, 1869, p. 68, and in the *Sixth Annual Report of the United States Geological Survey of the Territories*, for the year 1872 (Hayden), 1873, p. 740:

A reddish, coriaceous, flattened species, with the body oblong-oval, contracted just behind the middle; head short and broad, not spined behind, with two deep round pits; palpi and beak together, unusually short; palpi long and slender; labium short and broad, densely spined beneath; above, the mandibles are smooth, with terminal hooks; thoracic shield distinct, one-third longer than wide, smooth and polished, convex, with the lyrate mesial convexity very distinct. The whole body is sparsely covered with minute hairs. Legs long and slender, pale testaceous red; coxæ not spined. Length of body, 0.15 of an inch; width, 0.09 of an inch.

Habits.

By the aid of the teeth and hooks, with which the mouth parts of the tick are furnished (see accompanying figure), it penetrates the skin of the animals which it attacks, and burying its head and anterior portion of its body in the opening made, it gorges itself upon the blood. They have been known to occur in such numbers upon cattle as almost to cover them, being so closely crowded together in portions of their body "that a knife-blade could scarcely be thrust between them." It is easy to conceive that in such cases death would naturally ensue from the attendant loss of blood, the resulting inflammation and, as it is thought, the poison thrown into the wound. It is not confined to cattle, but has been found on other mammals, as the porcupine and hare, and on some reptiles.

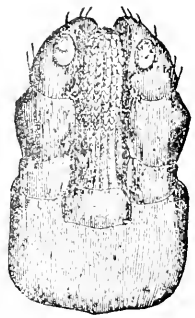

Fig. 25.—Mouth-parts of Ixodes bovis. (After Packard.)

In an instance recorded by Murray, it was taken from the neck of a miner in Utah, a portion of whose skin was left adhering to the rostrum, as may be seen in the specimen preserved in the British Museum.

Dr. Hagen has published in *Entomologica Americana* for November, 1887 (iii, p. 124), an interesting account of *Ixodes bovis* having been removed alive, by John Orne Green, M. D., of the Harvard Medical School, from the ear of a man, where its presence had been indicated by itching and obstruction of the passage, dating back to a residence on a cattle ranch in Arizona, four months previous.

Other Species of Ixodes.

Other species of the genus are known to attack the human species, and instances are recorded of persons having suffered severely from the wounds of the *Ixodes Americanus* Linn., *I. unipunctatus* Pack., *I. cruciarius* Fitch, and others. A species of tick occurring in Persia, the *Argas Persicus*, is said to be so exceedingly venomous that death frequently results from its bite in less than twenty-four hours. A nearly allied species, *Argas Americanus* Packard, has been taken from cattle in Texas.

Remedies.

An effective remedy for the *Ixodes bovis* when occurring on cattle, will be found in a strong kerosene emulsion, which could be applied with a force pump and thoroughly rubbed in by hand. An application of kerosene and lard — one part of the former and three parts of the latter — rubbed in with a rag while warm, has been recommended in Bulletin 5 of the Iowa Agricultural Experiment Station, for destroying lice infesting cattle, and would doubtless be effective against the cattle-tick.

Bryobia ? pratensis Garman.

Infesting a Dwelling-house.

(Ord. Arachnoidea: Fam. Trombidiidæ.)

The following notice of a mite that is becoming very troublesome from its frequent invasions of dwelling-houses and other buildings, appeared in the *Ohio Farmer* of March —, 1889:

Mrs. J. H. O., of Napoleon, Ohio, writes that a small insect has taken possession of her house and wishes to know what it is. Of its abundance she says :

"They seem to be most troublesome in rooms we do not occupy every day. They resemble chicken vermin, but are different in color. When very young they look like specks of brick dust, but do not move when they are of that size. When they are old enough to travel they look like specks of blood moving around. The fully grown ones are of a brown color with red legs. They seem to come from out of doors, crawling through every crevice, under windows and base boards. They climb up the walls and windows. The tops of my curtains were nearly covered before I noticed them. They will stick on them and breed, and along the border of the carpet. One year ago this spring I noticed a few along the edge of the carpet. I took up the carpet and scalded the floor with hot soapsuds, and did not see any more until last fall. I have tried everything that I could hear of that would kill insects, but nothing will have any effect on them except kerosene, when I can get it to touch them, but it will soon evaporate, and then they will come thicker than before. I have never

seen or heard of anything like them, and do not know how to get rid of them."

The trouble is probably caused by a small red mite related to the red spider of the greenhouse which not unfrequently invades houses in the manner described by our correspondent. It apparently feeds on green vegetation, and the warm sunshine of early spring brings it out of its winter quarters to search for food.

The above, together with a subsequent communication to the *Ohio Farmer*, given below, were submitted to me for further reply. My answer covering, as far as could conveniently be done, both inquiries, was published in the *Ohio Farmer* of April 13, 1889.

Eds. Farmer.—The small red mites described in a late number of your paper, have made their appearance in countless numbers in our house, for three successive years, each year increasing in numbers. How can we get rid of them? We are more interested in the cure than in the natural history of the pest. An early reply will greatly oblige us. Mrs. E. H. C.

Bloomingdale, Mich.

In all instances like the present, of any unusual occurrence of a pest, particularly when they infest our homes and seriously interfere with our comfort, it is quite desirable that a scientific determination of the species be made, in order that the circumstances attending the invasion, may become a part of the life-history of the insect or the creature. While a remedy for the intrusive guests may be all that is desired by their host, yet the scientist deems it quite important that he should know the particular species for which he is asked to prescribe a remedy. Treatment that may be fatal to one member of a genus may be harmless to another. I would therefore esteem it a favor if Mrs. E. H. C. would send me examples for identification, if they are still to be found, of the mite, about which inquiry is made.

So far as we may judge from the features and habits of the mite, as given in the issue of the *Ohio Farmer* on page 214, it is probably a species of *Bryobia*, one of the "harvest mites," belonging to the family of *Trombididæ*, and related to the common "red spider," *Tetranychus telarius* of our gardens, house-plants, and greenhouses.

Notices of Swarming Mites.

The above mite may have been the same species that was reported to me on June 16th last, as occurring in the vicinity of Albany, N. Y., in large numbers in a house that had been newly lathed, plastered and painted, but of which no particulars were given. Another occurrence, of perhaps the same mite, during the month of May, in Susquehanna county, Pa., was noticed by me in the *Country Gentlemen* of

June 9, 1881. Its presence was first observed on a kitchen window, and subsequently, in a box of clothing, in a seldom-used chamber, and upon the walls, floor and furniture of the corner of the room where the box was standing.

Still another instance of a house infested by these "swarming mites," is reported by Professor Riley, in his report for the year 1884, page 413 [129], as follows: "Specimens of some of the almost omnivorous species of the mite, genus *Bryobia*, were sent by Mrs. I. H. Easterbrook, Providence county, R. I., with the statement that these insects were all over her house, inside and out, where they were first discovered about the eighth of May. Mrs. E. found, under the window-sills on the outside, webs, where they seemed to be hatching. * * * Specimens of the same were also sent in May by Mr. George N. Kimball, of Waltham, Mass., with a similar account of their habits."

Two species of *Bryobia* infesting and injuring meadows, have been described by Mr. H. Garman, in the *Fourteenth Report on the Insects of Illinois*, 1885, pp. 73, 74; and in *Insect Life*, 1889, pp. 277–279, Professor F. M. Webster has published "Notes on a Species of Bryobia Infesting Dwellings" at Lafayette, Ind., which may be identical with the species upon which my present notes are based. See also an article on "Late Autumnal Occurrences of Mites in Great Numbers" in *Insect Life*, i, 1889, p. 252.

The mites (*Acarina*) have received little study, either in Europe or in this country. Comparatively few American species are known. Very little has as yet been learned of their habits. The division to which the common "red spider" belongs, known as "spinning-mites," from the fine, almost invisible web that they construct, are found on plants, and are believed to be entirely vegetarian, while the harvest mites, to which *Bryobia* pertains, are, in part, predaceous and carnivorous. These latter are often found in vast numbers out of doors, in fields, on various plants, under stones, on gravel walks, on pieces of wood, in damp moss and decaying leaves, on the sand of river banks, as parasitic on insects and other animals, etc. No satisfactory reason can be assigned for their entering dwellings-houses in such numbers as above reported. It is not probable that their natural food is found in sufficient abundance in such localities. It would seem that their entrance is usually made through a window, and it may be that their intrusion is merely for the purpose of securing a sheltered place where they may oviposit (their breeding on curtains and edges of carpets is mentioned in the communication from Napoleon, Ohio).

Perhaps, in this instance, they had been feeding upon the minute *Psoci* and other small insect forms that are usually found in the crevices and between the overlapping siding of wooden dwellings during the spring months.

Remedies.

We are unable to give the result of any experiments made in destroying these mites in an infested dwelling, but from what is known of their nature, we would suggest the following as effective and simple remedies: 1. Flour of sulphur, distributed with a powder bellows. 2. Fresh pyrethrum powder, applied in the same manner, or in liquid form with a spraying apparatus. The Woodason bellows and atomizers, made at 451 Cambria street, Philadelphia, are excellent for these uses. 3. Kerosene, but preferably benzine, applied with an atomizer. In using the latter, air the room thoroughly before lights are introduced. 4. Fumigate, by burning brimstone in a metal vessel floating in a tub of water (to prevent setting fire to the room), the room being first tightly closed and so kept for several hours. This remedy may be resorted to where the entire apartment, walls, ceiling and floor are swarming with the mites.

Note.

From a notice in *Insect Life*, ii, 1890, pp. 278–9, which appeared since the above was presented for publication, of a mite infesting a house in Wilmington, Ohio, after the same manner as recorded from the other Ohio localities, and which was determined by the Division of Entomology at Washington as *Bryobia pratensis*, it seems quite probable that all these instances above noticed may be referred to the same species — entering houses for hibernation or breeding, and occurring and feeding on clover and grasses out of doors.

APPENDIX.

(A.)

LIST OF PUBLICATIONS OF THE ENTOMOLOGIST.

The following is a list of the principal publications of the Entomologist during the year 1889, giving title, place and time of publication and a summary of contents. A similar list of publications by the Entomologist, during the years 1880 and 1881, is appended:

Apple-Tree Tent-Caterpillar.* (Country Gentleman, for April 4, 1889, liv, p. 269, c. 1, figure — 29 cm.)

A belt of eggs on a peach tree twig, received from Warwick, N. Y., with inquiries, are those of *Clisiocampa Americana*. The belt is described and figured, and recommendation made of the collection and destruction of the egg-belts as directed, as the most effective means of preventing the ravages of the caterpillars.

Apple-Tree Bark-Louse. (Country Gentleman, for April 4, 1889, liv, p. 269, c. 2 — 13 cm.)

To an inquiry from Huron, Ont., of the best time for destroying this pest, *Mytilaspis pomorum*, its most vulnerable time is stated to be when the eggs are hatching, which is usually at the time when the trees are putting out their blossoms.

Remarkable Display of Eel-Worms. (Country Gentleman, for May 16, 1889, liv, p. 389, c. 1, 2 — 44 cm.)

A remarkable red appearance in a shallow stream at Saratoga Springs, N. Y., which has excited considerable attention, is found to be owing to the presence of myriads of small red worms belonging to the *Anguillulidæ*, and commonly known as "eel-worms." The conditions under which they were occurring are stated, as also their susceptibility to alarm and sudden disappearance, and their habits and appearance, as subsequently observed, in confinement. Remarks on the *Anguillulidæ* in general and on some of the species.

Preserving Insect Specimens. (Country Gentleman, for May 23, 1889, liv, p. 409, c. 2, 3 — 13 cm.)

In reply to information asked, directions are given for preparing a "cyanide bottle" for the collection of insects, and the address of W. E. Saunders, 240 Central avenue, London, Ont., from whom insect pins for mounting specimens, may be obtained.

*The capitalization, etc., of the *Country Gentleman* is followed herein in the citation from it of titles of publications.

Cabbage Maggot. (Country Gentleman, for June 6, 1889, liv, p. 440, c. 4—10 cm.)

An infusion of burdock (its method of preparation given) is recommended as a remedy for attack if the larvæ have not burrowed into the stalks; if in that state, then take up the plant and destroy it, together with any larvæ that may be in the ground adjacent. Other remedies are caustic lime applied to the roots, unleached ashes about the plant, and kerosene emulsion.

Apple Tree Worm. (Country Gentleman, for June 6, 1889, liv, p. 440, c. 4—13 cm.)

For information of this insect reference is made to articles in the C. G. of June 21 and July 5, 1888, and April 4, 1889. The caterpillar is again very abundant and destructive the present year in Eastern New York. It may so easily be destroyed by methods that have been repeatedly pointed out, that to permit its injuries is a crime. The cost of its neglect is shown.

Rose-bug Destroying Peaches. (Country Gentleman, for June 6, 1889, liv, p. 441, c. 1—12 cm.)

If the old remedies used against this insect, *Macrodactylus subspinosus*, such as jarring on sheets, and dusting the foliage with plaster, slaked lime, oak ashes and road dust be found insufficient, then the remedy that the Rural New Yorker claims to be the simplest and most effective of all might be tried, viz., to spray the insect with pyrethrum powder in water — one tablespoonful to a gallon of water. Results asked for.

The Rose-Leaf Hopper. (Country Gentleman, for June 6, 1889, liv, p. 441, c. 1—20 cm.)

The *Tettigonia rosæ* of Harris, first appears early in May and matures late in the month. Whale-oil soap or tobacco water will kill the young larvæ. Pyrethrum powder will also kill them and their pupæ. Pyrethrum in water, and hellebore powder in water, and kerosene or a kerosene emulsion may also be used. It is more difficult to kill when it has become winged. It may then be driven on cloths saturated with kerosene or on tarred surfaces.

[The Forest Tent-Caterpillar Devastating Maples.] (Albany Evening Journal, for June 8, 1889, — 14 cm.).

Account of the ravages of *Clisiocampa sylvatica* as observed June sixth in a maple grove at Kingsbury, Washington county, N. Y. Not a leaf remained on trees seventy feet in height and two feet diameter of trunk.

Butternut trees had also been defoliated, but the insect could not be found.

Parasite on Potato Beetle. (Country Gentleman, for June 13, 1889, liv, p. 456–457, cols. 4, 1—26 cm.)

The parasite enveloping the potato-beetle in Roslyn, N. Y., is *Uropoda Americana* Riley. Its history is given, its description, place in classifi-

cation, its method of attaching itself to its host, and other insects on which it has been observed. Effort should be made to introduce this parasite in localities where it does not occur.

Grain Aphis. (Country Gentleman, for June 13, 1889, liv, p. 457, c. 1—10 cm.)

Examples of Aphides sent and reported as killing wheat in Allendale, Ill., are the grain aphis, *Siphonophora granaria* [should have been given as *S. avenæ*]. It is occasionally destructive, but does not promise to be so in this instance, as parasites are associated with it. No means are known by which formidable attacks of this insect can be arrested and the crop saved.

Apple-Tree Flies. (Country Gentleman, for June 13, 1889, liv, p. 457, c. 2 — 8 cm.)

A fly occurring "by millions" on apple-trees at Meadville, Pa., [June 4] is the white-winged Bibio, *Bibio albipennis*. Their appearance; abundance of their larvæ in fields at times and their food; harmlessness of the fly; why they resort to fruit-trees; reference to *Second Report Insects New York*, for additional information.

The Hop-yard Pest Reappears. (Albany Evening Journal, for June 20, 1889, p. 1, c. 7 — 21 cm. — Utica Morning Herald, of June 21, 1889. — Fort Plain Free Press, of June 25, 1889. — Country Gentleman, of June 27, 1889, p. 497, c. 1.)

Hop leaves sent from Glen, Montgomery Co., N. Y., show the presence of the hop-aphis in numbers sufficient to indicate a severe attack. A brief outline sketch of its history is given. The best preventive is destruction of its eggs on plum trees and of all wild plum trees in hop districts. The best remedies for attack are found in kerosene emulsion or fish-oil soaps. Method of preparing the emulsion and its proper strength. How the quassia and soap-wash used in England is made. Importance of immediate spraying infested fields.

The Currant Aphis. (Country Gentleman, for June 20, 1889, liv, p. 474, c. 3 — 21 cm.)

In reply to inquiry from Nicola Valley, British Columbia, of how to destroy the plant-lice that cluster on the tips of currant stems, answer is made that dipping the stems in, or spraying them with, pyrethrum water or tobacco water will kill most of them. All may be destroyed by a strong kerosene emulsion, as also its eggs in the autumn or winter if they are deposited on the stems. Undiluted kerosene may perhaps be used with safety. *Myzus ribis* is usually not very injurious — causes the leaves to curl badly; its life-history is not known. This species may not be *M. ribis*.

Asparagus Beetle. (Country Gentleman, for June 20, 1889, liv, p. 478, c. 2, 3 — 10 cm.)

Crioceris asparagi is identified in examples from Hartford, Conn. — its introduction and distribution; is best destroyed by air-slaked lime; reference to publications on it.

Grain Aphis. (Country Gentleman, for June 27, 1889, liv, p. 496, c. 3, 4—14 cm.)

Identification of *Siphonophora avenæ* on wheat from La Grange, Ill. Why it should be known as *avenæ* instead of *granaria*. Is not "a new insect" or the "wheat-midge" or the "green-midge" of recent agricultural and other journals. Prospects of its injuries in Indiana and Illinois to wheat this year.

Insect Depredations. (Country Gentleman, for June 27, 1889, liv, see p. 496, c. 4—11 cm.)

Remarks on the grain aphis on wheat in Indiana, reported by the press as "green midge," "wheat midge," etc. What it is, and its injuries this year and in preceding years.

Our Insect Enemies and How to Meet them. An Address before the New Jersey State Board of Agriculture, at its Annual Meeting at Trenton, February 1, 1889. Camden, N. J. [July], 1889, 8 vo., 22 pp.

Importance of Agriculture—its present and future. Economic Entomology. Importance of Entomological Study. The Secrecy of Insect Depredations. The Small Size of Insects. Number of Insects. Rapidity of Propagation. The Voracity of Insects. Can Insect Ravages be Prevented? How to Meet our Insect Enemies.

Early Appearance of the Common House-fly and its Fungus. (Albany Evening Journal, for July 11, 1889.)

Musca domestica has appeared in large numbers in Albany during the present week, while it rarely abounds before August—the result of the remarkable meteorological conditions of the year. The fungus peculiar to the fly has also attacked it. The early occurrence of this fungus, of rust on oats, and other fungi, indicate an unusual prevalence this year of rusts, blights, mildews, etc.

The Corn Worm. (New England Homestead, for July 13, 1889, xxiii, p. 237, c. 1—16 cm.)

Gortyna nitela is identified in a caterpillar sent from Hartford, Conn., feeding on the tassels of corn. While it has numerous food-plants, it is not recorded as an external feeder—always hitherto as a borer into stems or stalks or fruit. Description of the caterpillar, and in what particulars this example differed from others seen. Will probably not injure the tassels to the extent of interfering with proper pollenization.

Insects on Lima Beans.—Squash-bugs. (Country Gentleman, for July 18, 1889, liv, p. 543, c. 2—23 cm.)

In reply to inquiries from Monroe county, N. Y., of means for checking the ravages of an unknown insect that eats off Lima bean-plants just below the seed leaves—of the striped squash-bug—and the larger squash-bug, answer is made: The bean insect can not be named from

the mere statement made of its habits. The ravages of the cucumber beetle, *Diabrotica vittata*, may usually be prevented by dusting the plants with plaster of Paris and Paris green in the manner mentioned. The squash-bug, *Anasa tristis*, must be fought by destroying its eggs, by trapping as directed, and by repellants to prevent oviposition.

Remedies for the Hop-louse. (New England Homestead, for July 27, 1889, xxiii, p. 253, c. 6 — 22 cm.)

The best known remedies, are spraying the vines on the first appearance of the insect with the kerosene and soap emulsion (formula given), or the quassia and soap wash of the English hop-growers (formula also given). By the proper use of the above means, serious losses may be averted.

The Yellow Woolly Bear. (New England Homestead, for July 27, 1889, xxiii, p. 253, c. 6. — 12 cm.)

A caterpillar attacking many garden plants in Providence county, R. I., is *Spilosoma Virginica*, known in the winged state as "the white miller." The appearance and habits of the insect are given. They should be picked from the plants and crushed.

The Grain Aphis. (Country Gentleman, for August 1, 1889, liv, p. 579, c. 2 — 15 cm.)

Heads of rye from Stone Ridge, N. Y., show attack of this aphis, *Siphonophora avenæ* (Fabr.). Although the insect has been unusually abundant in several of the Western States this year, this is the only instance reported to me of its presence in New York. The heads contained seven examples of the aphis, each one of which had been parasitized. If the parasite can be reared, its name will be given hereafter.

Maple-Tree Borer. (Country Gentleman, for August 1, 1889, liv, p. 579, c. 2, 3 — 23 cm.)

Grubs working injuriously under the bark of maples in Stamford, Conn., are probably those of *Glycobius speciosus* — a beautiful but pernicious beetle. A preventive of its attack would be painting the trunk during July and August, from about its middle to (and including) the base of the principal limbs with soft soap and crude carbolic acid. A remedy is found in cutting out the young grub during August and September, when its presence is shown by the exuding sap, or later by its "frass" or castings.

The Cow-Fly. (Country Gentleman, for August 1, 1889, liv, p. 579, c. 3 — 20 cm.)

To a request from Freehold, N. J., for information regarding the cow-fly [*Hæmatobia serrata*], notices of it in the *Country Gentleman*, vol. liii, 1888, pp. 705, 759, 777, and 893 are referred to. For preventives of attack, applications to the cattle of the following are suggested: Kerosene, carbolic acid, soluble phenyle, tar-water, tansy-water, and naphthaline.

Insects in Wheat — Not Injurious. (The Rural New Yorker, for August 3, 1889, xlviii, p. 509, c. 1, 2 — 19 cm.)

Small, shining, black beetles, from Nebraska, found in browned and shriveled heads of wheat, are *Phalacrus politus* (Linn.). They are scavenger beetles, belonging to the Necrophaga. Remarks on the family of *Phalacridæ*. The wheat heads on which these beetles occurred had been attacked by the "smut" fungus, and the beetles had undoubtedly been drawn to the infested heads to feed upon the fungoid material, as is known to be the habit of an allied species, *Phalacrus penicillatus* (Say). The species is therefore to be regarded as a beneficial insect, and not an injurious one as was supposed by the sender.

Oak-Tree Pruner. (Country Gentleman, for August 29, 1889, liv, p. 651, c. 3, 4 — 12 cm.)

Sections of branches of red oak received from McGregor, Iowa, show the pruning by *Elaphidion parallelum* of unusually large branches. One section of an inch in diameter was completely severed, with the exception of a thin film of the outer bark. Another section of one inch and one-fourth was not so completely cut. Reference to a notice of the insect at some length in the *Country Gentleman* of September 9, 1886.

A Bombarding Beetle. (Country Gentleman, for September 5, 1889, liv, p. 671, c. 1 — 23 cm.)

The discharge of a "bombardier" is described and the effects of the vapor. All of the species of *Brachinus* have this means of defense, of which *B. fumans* is a common form. Bombarders are also found in other genera, as in *Anthomenus*, of Europe.

Black Blister Beetle. (Country Gentleman, for September 12, 1889, liv, p. 694, c. 2 — 15 cm.)

A beetle destructive to Chrysanthemums at Poughkeepsie, N. Y., is *Epicauta Pennsylvanica* De Geer. Its feeding habits are given. The remedies for it are beating from the plants into a basin of water with kerosene, or dusting with pyrethrum powder — one part to four of flour.

Mites in Bran. (Country Gentleman, for September 19, 1889, liv, p. 711, c. 2 — 9 cm.)

Inquiry is made from Holliston, Mass., of how to destroy a small white mite infesting bran stored for summer use (no examples sent). The mite is probably *Tyroglyphus siro*. The infested bran could be safely fed to stock. Should it become necessary to arrest the multiplication of the mites, they could be killed by tightly inclosing the infested bran, after placing upon it an open vessel containing bisulphide of carbon, in quantity proportioned to the amount of bran. The descending vapor would destroy all the animal life present.

The Peach Tree Borer — Ægeria Exitiosa. (Country Gentleman, for November 14, 1889, liv, p. 861, c. 1–3 — 50 cm.)

In reply to inquiries from Salem, N. J., are given: 1, the name and food-plants of *Ægeria exitiosa;* 2, description and figures of the moths; 3, the egg-laying from June to September (see C.-G. for February 9, 1888);

4, length of egg and caterpillar stages; 5, pupal development and transformation into the imago; 6, best preventives and remedies, as mounding, repellant washes, cutting out the borer — the last, the most effective.

The White Grub of the May Beetle (Lachnosterna fusca). (Transactions of the N. Y. State Agricultural Society, vol. xxxiv, for 1883–1886, [July] 1889, pp. 5–33, figs. 1–5.)

A reprint, with additions, of Bulletin 5 of the New York State Museum of Natural History. For contents, see *Fifth Report on the Insects of New York*, 1889, p. 308.

Cut-Worms. (Transactions of the N. Y. State Agricultural Society, xxxiv, [July] 1889, pp. 66–100, figs. 1–28.)

A reprint, with additions, of Bulletin 6 of the New York State Museum of Natural History. For contents, see *loc. cit. sup.*, p. 308.

The Aphididæ or Plant-Lice. (Transactions of the N. Y. State Agricultural Society, xxxiv, [July] 1889, pp. 101–115, figs. 1–9.)

A reprint (with illustrations and additional matter) from the Proceedings of the Western N. Y. Horticultural Society, 1887. For contents, see *Fourth Report on the Insects of New York*, 1888, p. 194.

Insects in Cord Wood. (Country Gentleman, for November 14, 1889, liv, p. 862, c. 3 — 10 cm.)

Sounds from wood stored in a dry cellar, can not, as supposed, be from worms or spiders, nor can the noise, as described, be caused by insect burrowers. From the statement as made, no satisfactory explanation can be offered.

A Horn-Tail and its Enemies. (Country Gentleman, for November 21, 1889, liv, p. 881, c. 2, 3 — 23 cm.)

A horn-tail, received from Flanders, N. J., within its burrow in a piece of maple, is *Tremex columba* (Linn.). The characteristic features of the insect, and of the burrow inclosing it, are given, with remarks on the parasitism to which it is subject, as suggested by a portion of the ovipositor of its natural enemy, *Thalessa*, which has been broken off and is imbedded within the block of maple.

Report of the State Entomologist to the Regents of the University, State of New York, for the year 1888. (Forty-second Annual Report of the Trustees of the State Museum of Natural History, for the year 1888 [November 20], 1889, pp. 145–347, figs. 1–50.) Fifth Report on the Injurious and Other Insects of the State of New York [November 23d], 1889, pp. 205, figs. 50.

The contents are: Transmittal: Remedies and Preventives of Insect Attack: Cutting out the Squash-vine Borer. Change of Soil for Strawberry Plants. Brine for the Currant-worm. Saltpetre not a Preventive of Cabbage-fly Attack. Preventives of Cabbage-fly Attack. Beans for

Repelling the Striped Cucumber Beetle. Gas-lime for the Woolly-Aphis. How to Kill the Apple-tree Aphis. Tobacco Dust for Aphis Attack. A Lime Wash for Bark-lice. INJURIOUS HYMENOPTERA: Nematus Erichsonii *Hartig*—The Larch Saw-fly. Nematus salicis-pomum *Walsh*—The Willow-apple Gall Saw-fly. INJURIOUS LEPIDOPTERA: Darapsa Myron (*Cramer*)—The Green Grapevine Sphinx. Alypia octomaculata (*Fabr.*) and Eudryas grata (*Fabr.*)—The Eight-spotted Forester and the Beautiful Woodnymph. Phobetron pithecium (*Sm.-Abb.*)—The Hag-Moth Caterpillar. Anisota senatoria (*Sm.-Abb.*)—The Senatorial Oak Moth. Agrotis saucia (*Hübner*)—The Variegated Cut-worm. Mamestra picta *Harris*—The Zebra Cabbage Caterpillar. Mamestra grandis (*Boisduval*)—A Poplar-feeding Cut-worm. Penthina nimbatana (*Clemens*)—The Rose-leaf Tyer. Incurvaria acerifoliella (*Fitch*)—The Maple-leaf Cutter. INJURIOUS DIPTERA: Hæmatobia (Lyperosia) serrata *Rob. Desv.*—The Cow-horn Fly. INJURIOUS COLEOPTERA: Dynastes Tityus (*Linn.*)—The Spotted Horn-bug. Oberea bimaculata (*Oliv.*) The Raspberry-cane Girdler. Galeruca xanthomelæna (*Schrank*)—The Elm-leaf Beetle. INJURIOUS HEMIPTERA: Clastoptera obtusa (*Say.*)—The Alder Spittle-Insect. Siphonophora avenæ (*Fabr.*)—The Grain Aphis. Myzus cerasi (*Fabr.*)—The Cherry Aphis. INSECT ATTACK AND MISCELLANEOUS OBSERVATIONS: The Canker-worm—Anisopteryx vernata. Abundance of Geometrid Larvæ. The Apple-leaf Bucculatrix. The Clover-seed Midge—Cecidomyia leguminicola *Lintn.* The Hessian-fly—Cecidomyia destructor *Say.* Sciara sp.? Occurring on Wheat. The Cabbage-fly—Anthomyia brassicæ *Bouché*. A Lady-bug Attack on Scale-Insects. The Carpet Beetle—Anthrenus scrophulariæ (*Linn.*). The Oak-pruner—Elaphidion parallelum *Newm.* Oviposition of Saperda candida *Fabr.* Orthaltica copalina (*Fabr.*). The Clover-leaf Weevil Destroyed by a Fungus Attack. Pœcilocapsus lineatus (*Fabr.*) Attack on Young Pears by a Plant-bug. An Experiment with the Thirteen-year Cicada. White Scale-insect Attack on Ivy—Aspidiotus nerii *Bouché*. The Black-knot of the Plum tree and its Guests. Collections in the Adirondack Region, et al. Collections in the Adirondack Region in 1885. ACARINA AND MYRIOPODA. A Mite Attack on Garden Plants. A Parasitic Mite of a Sexton Beetle. A Parasitic Attack on the Colorado Potato-beetle. The Cheese-mite Infesting Smoked Meats—Tyroglyphus siro (*Linn.*). The Cheese-mite Infesting Flour. Food of Cermatia forceps (*Raf.*). Julus cæruleocinctus beneath carpets. APPENDIX: (A.) LIST OF PUBLICATIONS OF THE ENTOMOLOGIST. (B.) CONTRIBUTIONS TO THE DEPARTMENT. GENERAL INDEX. PLANT INDEX.

The Bean Weevil. (New England Homestead, December 21, 1889, xxiii, p. 425, c. 2, 3—9 cm.).

As this is usually a local insect, perhaps the best way to meet it is, by general agreement, to refrain from planting beans in an infested district for a year or two, when the beetles, not flying far for oviposition, would die without progeny. When occurring within beans, they may be killed by dropping the beans for a quarter of a minute in hot water, or by subjecting them, in a tight vessel, to the vapor of bisulphide of carbon (directions given).

Publications of the Entomologist During the Years 1880 and 1881.

The Pickled-Fruit Fly — Drosophila Ampelophila. (Country Gentleman, for January 1, 1880, xlv, p. 7, c. 3, 4 — 37 cm.)

Flies taken from decaying peaches are identified and described. Little is known of our Drosophilas. Notices of a few are referred to. They vary greatly in their habits. The manner in which pickled fruits in jars become infested, is stated.

Rat-tail Larva of a Syrphus Fly. (Country Gentleman, for January 22, 1880, xlv, p. 55, c. 1, 2 — 18 cm.)

The larvæ taken from decaying mold are described. They belong to the *Syrphidæ*, of which characteristics are given. From the resemblance of the larvæ to figures of *Merodon bardus* they are probably of that species.

[See *Mallota posticata*, *First Report on the Insects of New York*, 1882, *pp.* 211-216.]

Report on some Injurious Insects of the Year 1878. [An Address delivered at the Annual Meeting of the N. Y. State Agricultural Society, January 22d, 1879.] (38th Annual Report of the N. Y. State Agricultural Society, 1880, pp. 61–72.— Separate, with title-page and cover, pp. 14 [January] 1880.) Also, [in Transactions of the N. Y. State Agricultural Society for the Years 1877–1882, xxxiii, 1884, pp. 97–112.]

Importance of the study of insects in their economic relations: Discovery and description of the larva of the clover-seed fly, *Cecidomyia trifolii* n. sp. [subsequently changed to *leguminicola*] and its injuries: *Anthrenus scrophulariæ* noticed, in its increase and spread, remedies available against it, and its European habits: Sudden multiplication of the flea, *Pulex irritans* in Boston: *Euryomia Inda* operating as a new corn depredator: Description, habits, and natural history of the peach-twig moth, *Anarsia lineatella*, with its attack by a parasite.

Entomology in America in 1879. (American Entomologist, for January and February, 1880, iii, pp. 16-19, 30-34.)

Presidential address before the Entomological Club of the American Association for the Advancement of Science, at its Saratoga meeting, August 26, 1879, giving a review of progress during the year, as shown in the publications (cited) in the several orders, and in special studies conducted.

Poduridæ (Spring-Tails) in a Well. (Country Gentleman, for February 12, 1880, xlv, p. 103, c. 2—15 cm.)

The species, occurring in a well in Massachusetts is identified as *Lipura fimetaria*, the same as those taken from a cistern, and noticed in the *Country Gentleman* of May 22, 1879, where additional information is given of them and of the family to which they pertain.

A New Wheat Pest. (Country Gentleman, for February 19, 1880, xlv, p. 120, c. 2, 3—12 cm.)

The insect occurring in abundance in wheat-fields in Charlotte, N. C., is identified by Mr. P. R. Uhler, as a leaf-hopper, about to be described by him as *Cicadula exitiosa*. Has been known for several years as injurious to wheat in the Southern States.

The Apple Curculio — Anthonomus Quadrigibbus *Say*. (Country Gentleman, for March 4, 1880, xlv, pp. 150, 151, c. 4, 1—28 cm.)

Gives the distribution of the insect, its general appearance, its natural history, and remedies for its ravages.

Worms in Rose Pots — Larvæ of Bibio Albipennis. (Country Gentleman, for March 11, 1880, xlv, p. 167, c. 1, 2—36 cm.)

The larvæ, sent from New York, are described, and identified as of the Genus *Bibio*, probably *albipennis*. The features and habits of *B. albipennis* are given. It is believed not to be injurious to vegetation. The robin feeds upon it.

The New Wheat Pest. (Country Gentleman, for March 11, 1880, xlv, p. 167, c. 2—10 cm.)

Until the habits of the insect, *Cicadula exitiosa*, are observed, it will not be possible to say whether it will attack clover sown in wheat-fields about the middle of March, of which inquiry is made.

The Natural History of Bacteria. (Country Gentleman, for March 25, 1880, xlv, pp. 203, 204, c. 4, 1—60 cm.)

The nature of Bacteria; conditions of occurrence, rapidity of multiplication; interest attaching to them as disease germs in splenic fever, typhoid and yellow fever; the bacteria in hog-cholera; Tyndall's experiment showing bacteria germs in common atmosphere, and the destruction of bacteria by disinfectants and by heat.

The Raspberry Gouty-gall Beetle. (Country Gentleman, for April 1, 1880, xlv, p. 215, c. 1—18 cm.)

In reply to inquiry of the oviposition of this insect, *Agrilus ruficollis* (Fabr.) its natural history is given and method of controlling its injuries. References are made to the principal writings upon it.

[See page 123 of this Report.]

Wheat Insects. (Country Gentleman, for April 15, 1880, xlv, p. 247, c. 2—17 cm.)

Insects attacking wheat in Ohio and in Virginia, are *Siphonophora avenæ* (Fabr.). Its habits are given and its liability to have its threatened multiplication averted by Chalcid parasites, etc.

The Apple-Leaf Bucculatrix. Bucculatrix Pomifoliella *Clemens*. (Country Gentleman, for April 22, 1880, xlv, p. 263, c. 2, 3—36 cm.)

The cocoon of this insect and the caterpillar are described. Its distribution in New York and in the United States; some items in its natural

history; means for its destruction, and reference to writings upon it are given.

[See *First Report Insects of New York*, 1883, pp. 157–162, figs. 41–43.]

Diseased Quince Twigs. (Country Gentleman, for April 22, 1880, xlv, p. 264, c. 2—6 cm.)

Quince twigs are sent from Woodmont, Conn., with supposed attack of a borer at the junction of last season's growth with the old wood. No insect attack is discernable. The appearance is that of the black-knot on plum, and it may be of fungoid origin.

A Poisonous Centipede—Cermatia Forceps *Raf.* (Country Gentleman, for May 13, 1880, xlv, p. 311, c. 2—19 cm.)

The centipede is described—was first observed in Albany in 1870, since which time it has rapidly increased, while in New England it is so rare that mention is made of every example noticed. Notwithstanding its name as above (from Packard), it is believed to be harmless.

[See *Fourth Report on the Insects of New York*, 1888, pp. 128–134.]

The Rose Bug. Macrodactylus Subspinosus *Fabr.* (Country Gentleman, for June 24, 1880, xlv, p. 407, c. 1–3—67 cm.)

Notices its abundance in the vicinity of Albany, its general features, earliest mention of its ravages, its food-plants, abundance, habits, means of prevention, and remedies for it. A bibliography is appended.

[Extended in *First Report on the Insects of New York*, 1882, pp. 227–232.]

Tallow to preserve Insect Collections. (American Entomologist, for June 1880, iii, pp. 145, 146.)

The odor of tallow repellant to various insects: woolen goods protected from clothes-moth by paper-wrapped tallow-candles placed among them; has been used in entomological collections to protect from *Dermestidæ;* experiments with tallow and Dermestes larvæ confined in a glass jar.

Carpet Bug. *Anthrenus scrophulariæ* Linn. (Johnson's Natural History, by S. G. Goodrich, ii, 1880, p. 651–2, figs. *a* – *d.*)

Its first observation in the State of New York in 1874, and nature of its depredations; its several stages; remedies; introduction from Europe; *Anthrenus lepidus* is a variety.

A Potato Beetle.—Coptocycla Clavata (*Fabr.*) (Country Gentleman, for July 1, 1880, xlv, p. 423, c. 2, 3—18 cm.)

The beetle received from Morristown, N. J., is identified and described. It is not regarded as very injurious to the potato. Its shield of excrementa is mentioned. Its early stages have not been described.

[See page 126 of this Report.]

Cut-Worm Moth. (Country Gentleman, for July 1, 1880, xlv, p. 424, c. 1, 2 — 20 cm.)

Agrotis clandestina Harris, sent for name, is produced from a cut-worm, the habits of which are stated, as also the habits of cut-worm moths, and of this species in particular.

Eggs of Army Worm. (Country Gentleman, for July 1, 1880, xlv, p. 424, c. 2 — 6 cm.)

Eggs contained in frothy matter, attached to blades of grass and edge of clover leaves, received from Erie, Pa., are identified as belonging to *Leucania unipuncta.*

The White Grub Worm — Lachnosterna Fusca. *Frohl.* (Country Gentleman, for July 8, 1880, xlv, p. 439, c. 1 — 13 cm.)

Destructive to roots of grass. May exist in numbers without evidence of injury, as in instances upon the capitol grounds at Washington. Plowing for exposing to birds, and pigs for rooting, the best known remedies.

The Hessian Fly. (Country Gentleman, for July 8, 1880, p. 439, c. 1, 2 — 21 cm.)

Straw from Newbern, Va., June sixteenth, with pupæ of this insect. Its abundance at intervals in the United States. Its natural history. Late fall sowing as a preventive, with an earlier sown strip to invite oviposition for the destruction of the eggs. Varieties of wheat less liable to attack, as Clawson, Fultz, etc.

A Leaf Eater. (Country Gentleman, for July 8, 1880, xlv, p. 439, c. 3 — 3 cm.)

Insects appearing in a wheat field in Deposit, N. Y., are identified as the hairy-necked leaf-eater, *Phyllophaga pilisicollis.* Its larvæ are destructive to the roots of grass and other cultivated plants.

[Now known as *Lachnosterna tristis* (Fabr.).]

The Squash Borer. (Country Gentleman, for July 15, 1880, xlv, p. 455, c. 2, 3 — 26 cm.)

Larvæ very destructive to vines in Highland, N. Y., are identified as *Ægeria (Melittia) cucurbitæ* Harris. The features of the moth, its oviposition, larval habits, and means for prevention of attack, are given.

[See *Second Report Insects of New York*, 1885, pp. 57-68, figs. 3-6.]

The Stalk-Borer (*Gortyna nitela*). Guen. (Country Gentleman, for July 22, 1880, xlv, p. 472, c. 1, 2 — 14 cm.)

Reported as injurious to potatoes in Bennington, Vt. Reference to extended notices of the insect, and means for its destruction given. Injures wheat and corn in Western States.

[See *First Report on the Insects of New York*, 1882, pp. 110-116.]

The Striped-blister Beetle — *Epicauta vittata.* (Country Gentleman, for July 29, 1880, xlv, p. 488, c. 1 — 7 cm.)

Received from Cayuga County, N. Y., and said to be more injurious to potatoes than the Colorado beetle. Is at present very abundant about Albany, and reported as destroying a garden in a night. Beating into a pan with kerosene recommended for its destruction.

The Basket-worm — *Thyridopteryx ephemeræformis.* (Country Gentleman, for August 19, 1880, xlv, p. 535, c. 4 — 15 cm.)

In reply to information asked of a worm destroying arbor vitæ at Bayside, N. Y., a description of the basket, habits of the contained larva, appearance of the male and female moths, and best method of checking the ravages, by hand-picking, are given.

The Basket or Bag Worm — Thyridopteryx Ephemeræformis. (Country Gentleman, for September 30, 1880, xlv, p. 631, c. 3, 4 — 17 cm.)

Reported as destroying arbor vitæ hedges in West Brighton, N.Y. Its food-plants mentioned, present stage of the insect, may be destroyed by insecticides during larval growth, but hand-picking preferable.

Caterpillars on the Ampelopsis. (Country Gentleman, for October 7, 1880, xlv, p. 647, c. 2, 3 — 16 cm.)

The moths of the two blue caterpillars of which inquiry is made, are *Alypia octomaculata* and *Eudryas grata*. If the vines attacked by the larvæ are not too large, they may be hand-picked; if quite large the caterpillars may be killed by showering with hot water from a garden hose.

[See *Fifth Report on the Insects of New York*, 1889, pp. 37-41.]

The Harlequin Cabbage-Bug — Murgantia Histrionica (*Hahn.*). (Country Gentleman, for October 21, 1880, xlv, p. 679, c. 1-3 — 81 cm.)

A description of the insect is given, followed by its distribution from Texas northward; its present range and probable future extension; its history; difficulty of killing by means usually employed against insects; the most efficient remedies; freedom from parasitic attack, and citation of its literature.

[Extended in *First Report on the Insects of New York*, 1882, pp. 264-271, f. 77.]

The Two-Spotted Tree Hopper — Enchophyllum Binotatum. (Country Gentleman, for November 4, 1880, xlv, p. 711, c. 1-3 — 47 cm.)

In reply to inquiries made, the cocoon-like forms on twigs are identified as egg coverings of the above-named insect. The insect, its eggs, and transformations are described, the plants upon which it occurs are named, and the means for preventing its injuries stated.

[Extended in the *First Report on the Insects of New York*, 1882, pp. 281-288, figs. 79-84.]

Flour-Paste Flies. (Country Gentleman, for November 18, 1880, xlv, p. 743, c. 2—12 cm.)

Flies bred from flour-paste are found to be a species of *Drosophila*. The features of the pupa-cases and the flies are given. They differ from *D. ampelophila*.

[See page 116 of this Report.]

Lepidoptera of the Adirondack Region. Collected by W. W. Hill in 1875–1878. (Seventh Annual Report on the Progress of the Topographical Survey of the Adirondack Region of New York, by Verplanck Colvin, Albany, 1880, pp. 375–400. Separate, with title-page and cover [November], 1880, pp. 375–400.)

Records 415 species collected, with sexes and dates of collection. Remarks upon the method of sugaring employed; proportion of the sexes tabulated: rare and new species; sub-arctic character of some of the species; successful collection of Plusias; Plusias at sugar and at flowers; local lists of Lepidoptera published.

Report on some Injurious Insects of the Year 1879. [Presented to the N. Y. State Agricultural Society at its annual meeting, January 21, 1880.] (Thirty-ninth Annual Report of the N. Y. State Agricultural Society, 1880, pp. 35–55.) Also [in Transactions of the N. Y. State Agricultural Society for 1877–1882, xxxiii, 1884, pp. 142–164, figs. 4].

After prefatory remarks on the progress and present position of economic entomology in the United States, the following insects are discussed: the clover-seed midge, *Cecidomyia leguminicola* Lintn., p. 144; the clover-root borer, *Hylesinus trifolii* Müll., with figures, p. 148; the wheat-stem maggot, *Meromyza Americana* Fitch, p. 150; the corn curculio, *Sphenophorus zeæ* Walsh, with figures, p. 154; the stalk-borer, *Gortyna nitela* Guenée with figures, p. 157; the apple-tree case-bearer, *Coleophora malivorella* Riley, with figures, p. 161; concluding with a notice (p. 163) of the entomological labors of Dr. Asa Fitch, whose death had occurred during the year (April 8, 1879).

[Address before the Farmers' Club of Onondago county, N. Y., December 4, 1880.] (Syracuse Morning Standard, for December 6, 1880; p 4, c. 2, 3, 4 — 129 cm.)

The magnitude of agricultural interests; importance of entomological investigations; progress made in entomological study; its absolute necessity; causes for increase in insect ravages; promoted by cultivation of crops in large areas; increase of apple insects; why it is necessary to contend with insect pests; how they may be best controlled; how economic entomology may be promoted; its study in schools; aid that legislation may extend; what the general government and the State have already done.

The Bean Weevil — Bruchus Fabæ. (Country Gentleman, for January 6, 1881, xlvi, p. 7, c. 2 — 12 cm.)

Field and garden beans from Northampton, Mass., are infested with the above insect — its first appearance in this locality in forty years' experience. It was noticed about twenty years previously in some of the New England States; is now common in New York, and is extending over the Western States. As it may easily be distributed in planting

infested beans — if seed beans are kept tied tightly up in bags until the second year they will contain no living insects, and may then be safely planted.

A Flight of Ephemera. (Country Gentleman, for January 6, 1881, xlvi, p. 7, c. 2, 3—22 cm.)

Remarkable flights of insects (accounts quoted) in 1879 and 1880 in Essex Co., Va., and in the present year when "they were followed by millions of swallows," are recognized from the descriptions given as some species of ephemera or "day-fly." The *Ephemeridæ* are often abundant near lakes and rivers, as in instances stated; their larvæ (aquatic) live two or three years, and the imago of some species two weeks; are favorite food for fishes. About 200 species are known.

On the Importance of Entomological Studies. (Papilio for January 15, 1881, i, p. 1, 2.)

Shown in the literature of entomology, the scientists engaged in the study, and the aid extended to it by the States and General Government. Is of greater importance in this country than elsewhere, from the abundance of agricultural products, and the extensive scale on which they are cultivated inviting and promoting insect attack.

Description of a New Species of Eudamus. (Canadian Entomologist for April, 1881, xiii, pp. 63-65.) Republished in [First Annual Report on the Injurious and other Insects of the State of New York, 1882, pp. 338, 339].

Describes *Eudamus Electra*, from an example captured in Hamilton, Ontario. Noticed as an interesting discovery for this portion of North America.

The Asparagus Beetle — Crioceris Asparagi (Linn.). (Country Gentleman, for April 14, 1881, xlvi, p. 243, c. 1-3—70 cm.)

History of the insect from its appearance on Long Island in 1859; Dr. Fitch's writings on it; attacked by a parasite; its distribution of about twenty miles a year; the beetle described; characters of the *Chrysomelidæ*, to which it belongs; transformations of the insect. Remedies are, employing fowls to hunt them and cutting down the young seedlings. Mr. Fuller's lime remedy deemed the best; bibliography of the species.

[Extended in the *First Report on the Insects of New York*, 1882, pp. 239-246.]

The Army Worm. The Invasion of Northern New York by this Destructive Pest. (Albany Evening Journal, for May 23, 1881, p. 3, c. 1—46 cm. Country Gentleman, for June 2, 1881, xlvi, p. 359, c. 1, 2—46 cm.)

Recent reports published of the invasion not exaggerated, as appears from personal observations made. Its observed extent is given and nature of attack on pasture lands and meadows. Not positively identi-

fied as the army-worm; no marches observed; may prove a new depredator; promises to be more destructive later; recommendations made for the arrest of the injuries.

[See *First Report on the Insects of New York*, 1882, pp. 127-149.]

On Some Species of Nisoniades. (Papilio, for May, 1881, i, pp. 69–74. Separate, June, 1881, pp. 1—6.) Republished in [First Annual Report on the Injurious and Other Insects of the State of New York, 1882, pp. 333–337].

Describes *Nisoniades Nervius*, *N. Petronius*, and *N. Somnus* as new species, and gives comparative notes on *N. Propertius*, *N. Juvenalis*, and *N. Icelus*. Remarks on a tibial hair-pencil in several species. Claims as a good species *Eudamus Nevada*, and notes the occurrence in New York of *Eudamus Proteus*.

The "Army Worm" Invasion of Northern New York. (St. Lawrence Republican, for June 8, 1881, li, cols. 7, 8, 9—197 cm.)

Notice of the operations of the caterpillars—not like those of the army-worm; their assemblage on an oak; habits of the army-worm, and how it may be controlled; description of the larvæ seen; secrecy of the attack; some of the larvæ identified as *Nephelodes violans* Guenée; the present abundance very remarkable; speculations on its reappearance another year.

A New Insect [Pest]—Not the Army Worm. (Country Gentleman, for June 9, 1881, xlvi, p. 375, c. 1—23 cm.)

The insect in Northern New York supposed at first to be the army-worm, is *Nephelodes violans* Guenée, which had never before been known as injurious. Its injuries are now decreasing, and there will not be a second brood the present year.

Insects on Plum Trees. (Country Gentleman, for June 9, 1881, xlvi, p. 376, c. 2—10 cm.)

The insects identified—none are injurious. *Bibio femoratus* ? sent is harmless. The plum curculio also attacks the cherry.

Mites in Clothing. (Country Gentleman, for June 9, 1881, xlvi, p. 376, c. 2—7 cm.)

A box of clothing in a seldom-used chamber in Susquehanna county, Pa., was found infested with mites; the walls, floor and furniture near it were almost covered with them. The species was not identified, but was apparently allied to *Tetranychus telarius*. They could be destroyed with powdered sulphur or Persian insect powder.

[The mite was probably *Bryobia pratensis* : See p. 158 of this Report.]

The Late Insect Invaders of Northern New York. (Albany Evening Journal, for July 1, 1881—42 cm.)

Some of the larvæ collected at Potsdam have been identified as *Nephelodes violans* Guenée. From other collections one example of

Crambus exsiccatus Zeller has been reared. Cocoons collected from a locality where the injuries are severe, are those of a Pyralid, which was probably the chief depredator. Remarks are added on the *Crambidæ*.

The Orchard Caterpillar. (Country Gentleman, for July 14, 1881, xlvi, p. 455, c. 3—10 cm.)

A cocoon from a deserted nest of *Clisiocampa Americana*, is of that species. A few of the caterpillars occasionally spin up within the nest, instead of elsewhere, as is the rule.

Worms on Tomatoes. (Country Gentleman, for July 14, 1881, xlvi, p. 456, c. 3—5 cm.)

The "light-brown worm or fly," reported from Newark, N. J., as cutting away every tomato blossom two or three days after opening, can not be named without examples of the insect.

Pear-tree Blight. (Middleburgh Gazette, for July —, 1881—25 cm.)

An apparent blight is sometimes caused by insect attack, but the true pear-tree blight is always associated with bacteria in the circulation, and is believed to be occasioned by their presence. The best methods of dealing with the disease are given.

Insects and Fungus on Quinces. (Country Gentleman, for August 18, 1881, xlvi, p. 535, c. 1, 2—75 cm.)

Quinces from South Byron, N. Y., the crop of which has been nearly destroyed, contain the larvæ of the quince curculio (*Conotrachelus crataegi* Walsh), and of the apple-worm (*Carpocapsa pomonella* Linn.). The former, more abundant, is described, its habits given, its destructiveness to quinces, and the available remedies. The fungus associated with the insect attack is *Roestelia aurantiaca*—a common association. Notes on the fungus are given. Some dipterous larvæ feeding on the fungus spores are described. The fruit and twigs showing the attack should be burned.

An Insect Pest. Preservation of our shade trees from its ravages. (Albany Evening Journal, for August 31, 1881—32 cm.)

The cotton bands observed about trees to protect from the caterpillar of the white-marked tussock-moth, *Orgyia leucostigma*, can only give protection if the trees are previously free from eggs or the larvæ, otherwise they may be harmful. The only effectual preventive is the destruction of the eggs, for which instructions are given. Recommendations are that each householder should remove the egg-masses from trees on his premises, and that the city authorities should require it. Destroy only the cocoons that bear the egg-masses. Make later search for the eggs when the trees are leafless.

Insects on Strawberry Roots. (Country Gentleman, for September 8, 1881, xlvi, p. 583, c. 1, 2—8 cm.)

To an inquiry from Richmond, Mass., of an insect abounding on strawberry roots, "dark-green and half as large as a pin's head," reply is made of inability to name it without examples.

Apple Leaf Cluster Cup Fungus. (Country Gentleman, for September 8, 1881, xlvi, p. 583, c. 2—10 cm.)

Leaves from Orange, N. J., are infested with this fungus, *Œcidium pyratum* Schw. Was first observed on wild crab. Has killed trees in Ohio and Tennessee. May be arrested by plucking leaves and cutting off boughs first infested, and burning. Characters of the fungus.

Beetle on the Tomato. (Country Gentleman, for September 8, 1881, xlvi, p. 584, c. 3—14 cm.)

Beetles from Canton, Ga., very destructive to the leaves of tomato vines are the ash-gray blister-beetle, *Epicauta cinerea* (Forster). It is common on the potato, but not previously reported on the tomato. Best remedy is to beat them into a pan with kerosene and water.

[See page 134 of this Report.]

Crambus vulgivagellus in Northern New York. (St. Lawrence Republican, for September 14, 1881.)

It is this species that has caused most of the destruction to grass-lands, and not *Nephelodes violans* as at first supposed. Its cocoons and the moths obtained therefrom are described. The moths are now emerging in the infested fields. The insect has never before been recorded as injurious.

Injurious Insects, with Special Notice of some New Insect Pests. [Read before the New York State Agricultural Society, at Elmira, September 13, 1881.] (The Husbandman [Elmira, N. Y.], for September 14, 1881, pp. 3, 6, 7—5 cols. Country Gentleman, for September 29, 1881, xlvi, p. 631, c. 2, 3—56 cm.; id. for October 6, 1881, p. 647, c. 1–3—52 cm.) Republished in (Forty-first Annual Report of the New York State Agricultural Society, for the year 1881. Albany [August], 1882, pp. 40–50. Transactions of the New York State Agricultural Society, xxxiii, for 1877—1882. 1884, pp. 221–234.)

Discusses the province of the Economic Entomologist; gives the history of the appearance of the Vagabond Crambus, *Crambus vulgivagellus* Clemens, in Northern New York; notices the punctured clover-leaf weevil, *Phytonomus punctatus* (Fabr.), and the Pyralid web-caterpillar, *Eurycreon rantalis* Guen.; with remarks on the progress recently made in Economic Entomology.

The Vagabond Crambus. (Ogdensburgh [N. Y.] Daily Journal, for September 21, 1881.—18 cm.)

The above popular name is proposed for the *Crambus vulgivagellus*, recently so destructive. Possibility of a second brood considered. Scattering ashes or plaster over the grass-lands the present month, recommended as a preventive of further injuries.

Grass Eating Grub. (Country Gentleman, for September 22, 1881, xlvi, p. 615, c. 2—14 cm.)

A grub destroying grass roots in Pownal, Vt., so that the whole turf can be raked off, and at Warrensburgh, N. Y., to the extent that the sod can be rolled up like a mat, is the white grub, *Lachnosterna fusca*. The insect is difficult to destroy. Relief may be had in plowing and exposing the grubs to birds and its other enemies, and in allowing hogs to root them out. In May and June the beetle may be shaken from trees and killed.

A Barn Beetle—*Lathridius pulicarius*. (Country Gentleman, for September 29, 1881, xlvi, p. 632, c. 2—11 cm.)

A beetle, identified as *Lathridius pulicarius*, is received from Westogue, Conn., where it is infesting a barn—on grain bags, a package of tobacco, and "overrunning everything." Little is known of the habits of this beetle. It is not regarded as injurious to any crop, and its abundance in the barn can not be accounted for.

A Remarkable Invasion of Northern New York by a Pyralid Insect, Crambus vulgivagellus. [Abstract of a Paper read before the American Association for the Advancement of Science, at its Cincinnati Meeting, in August, 1881.] (Science, for October 1, 1881, ii, p. 467. Proceedings of the American Association for the Advancement of Science, xxx, for 1881, pp. 267, 268.)

Gives the principal features of the recent remarkable abundance of this insect and its injuries.

A Peach Pest—Largus Succinctus. (Country Gentleman, for October 13, 1881, xlvi, p. 663, c. 1, 2—29 cm.)

A bug attacking nearly ripened peaches is the above-named species. Its principal features are given. It has not previously been recorded as injurious to fruit. The southern cotton-stainer, *Pyrrhocoris* [*Dysdercus*] *suturellus*, is allied to it. Its injuries to peaches can only be prevented by killing it; it might be attracted to refuse sugar cane or cotton seeds, as is the cotton-stainer, and then killed with hot water.

[A more extended notice in the *Second Report on the Insects of New York*, 1885, pp. 164-167.]

Insect Enemies of the Strawberry. (Country Gentleman, for October 27, 1881, xlvi, p. 695, c. 2, 3—39 cm.)

Strawberry leaves badly eaten (as described) are received from Lewisburg, Pa. The injury can not be referred to any known strawberry pest. It was not the work apparently of the strawberry worm. The principal strawberry insects are mentioned, viz., the white grub, the goldsmith beetle (*Cotalpa lanigera*), *Allorhina nitida*, the grapevine Colaspis, the strawberry crown borer, and the strawberry aphis. The depredator may prove to be *Paria aterrima* Oliv.

The Insects of the Clover Plant. [Read before the New York State Agricultural Society, at its annual meeting, January 19, 1881.] (Fortieth Annual Report of the New York State Agricultural Society, for the year 1880, pp. 10–26, figs. 1–6. 1881. Separate, with t. p. cover, pp. 17, figs. 6 [October] 1881.) Republished in [Transactions of the New York State Agricultural Society, for 1877–1882, xxxiii, pp. 187–207. 1884.]

Remarks on the value of the clover plant as a fertilizer, and on the increase of insect depredations on clover. Lists of European clover insect depredators, and of those known in this country are given. Of the latter a few are noticed in detail and illustrations given, viz.: the clover-root borer, *Languria Mozardi* Latr.; the clover-seed midge, *Cecidomyia leguminicola* Lintn.; the clover-leaf midge *Cecidomyia trifolii* Loew; and the clover Oscinis, *Oscinis trifolii* Burgess.

On the Life Duration of the Heterocera (Moths). [Read before the American Association for the Advancement of Science, at its Cincinnati meeting, August, 1881.] (Canadian Entomologist, for November, 1881, xiii, p. 218–220.) Republished in [First Annual Report on the Insects of New York, 1882, pp. 339–341.]

But little attention has been given to the subject, as it is difficult of investigation. The *Noctuidæ* especially have been little observed. The *Attacinæ* of the *Bombycidæ* have brief lives — the *Sphingidæ* somewhat longer. In the *Noctuidæ* it varies much. In *Xylina*, *Homoptera*, and *Catocala*, it may reach two months, and through hibernation, six additional months. The approximate life duration of the Noctuid moths is probably about three weeks.

The Corn Beetle. (Country Gentleman, for November 3, 1881, xlvi, p. 711, c. 1, 2—18 cm.)

A beetle feeding on corn just from the field, in Acton, Mass., is identical with the species determined [by Dr. LeConte] as *Lathridius pulicarius* [see page 183], but possibly an error has occurred in the determination. The injuries to the corn sent can not be due wholly to the insect, which appears not to attack whole kernels, but only such as had been previously broken.

The Cabbage Plusia — Plusia Brassicæ *Riley.* (Country Gentleman, for November 3, 1881, xlvi, p. 711, c. 2, 3— 41 cm.)

The insect, in different stages, is received from Dover, N. J., where the larvæ are reported as destructive to cabbage and Swede turnips, and the moths as ovipositing soon after sunset. The larva, pupa, and moth are described, with mention of the larval food-plants, injuries from the insect in the Southern States, its recent multiplication for the first in New York, its resemblance to *Plusia ni*, of Europe, and its two annual broods. As remedies, hand-picking, hot water and pyrethrum in powder or water are recommended. The bibliography of the species is given.

[Extended in *Second Report on the Insects of New York*, 1885, pp. 89–93.]

On the Life Duration of the Heterocera (Moths). [Abstract of a paper read before the A. A. A. S. at its Cincinnati meeting in August, 1881.] (Science for November 5, 1881, ii, p. 525. Proceedings of the A. A. A. S., xxx, for 1881, p. 268, 269.)

A summary of contents of the paper given on the preceding page may also serve for that of this abstract.

The Corn Worm — Heliothis Armigera *Hübn.* (Country Gentleman, for November 24, 1881, p. 759, c. 2, 3 — 51 cm. The Ontario County Times, for November 24, 1881, xxxi, p. 3, c. 5 — 59 cm.)

Corn in the husk with the attacking insect, from South Bristol, N. Y., indicates a formidable attack of the corn-worm, *Heliothis armigera*, which had never before been known as injurious in New York. Its injuries in Southern and Western States, and in the vicinity of Albany, its feeding habits, description of the caterpillar and moth, are given. It probably will not continue its injuries in New York in following years.

Habits of the Phylloxera. (Country Gentleman, for December 1, 1881, xlvi, p. 779, c.1 — 20 cm.)

In reply to inquiry from West Orange, N. J., of the Phylloxera mite found in galls on grapevine leaves, the gall-inhabiting form, type *gallicola* and the eggs are described, and reference made to Prof. Riley's Missouri Reports for the full history of the species.

The Bean Weevil — Bruchus Obsoletus (Say). (Country Gentleman, for December 8, 1881, xlvi, p. 795, c.1, 2 — 48 cm.)

The above-named insect reported from Sherman, Conn., as a new pest, is identical, according to Dr. Horn, with the *Bruchus fabæ* of Riley; is compared with *B. pisi*: its increase and present distribution. For preventives, cease growing beans for a year or two, or tie up in bags in which the beetles may die, or throw in hot water for a minute or two. Notice of the European *B. granarius*. Literature of *B. obsoletus*.

(B.)

CONTRIBUTIONS TO THE DEPARTMENT.

The following are the contributions that have been made to the Department during the year 1889:

In Hymenoptera.

Cells of the leaf-cutter, *Megachile* sp., in burrows in black ash from a swamp at Manchester, N. Y. From Dr. Peter Collier, N. Y. St. Agricultural Experiment Station, at Geneva.

A cluster of *Eulophus* pupa-cases. From Mrs. E. W. K. Lasell Orange, N. J.

Semiotellus clisiocampæ (Fitch) from cocoons of *Clisiocampa sylvatica* Harris. From T. E. Cross, Kingsbury, Washington Co., N. Y.

Larvæ of *Harpiphorus varianus* Norton, feeding on *Cornus stolenifera*. A jumping cocoon — unknown. From M. W. Vandenberg, M. D., Fort Edward, N. Y.

Thalessa lunator (Fabr.), from a maple. From Clara Williams, Meridian, N. Y.

In Lepidoptera.

Sixty-four examples of butterflies and two of moths, from South America, viz.:*

Papilio Thyastes Drury. 4.
P. Agesilaus Pesth. 3.
P. Proteus Boisd.
P. Ajax Linn.
P. Vertumnus Cram.
P. Sesostris Cram.
P. Cresphontes Cram. 5.
P. Ajax Linn.
? *Pieris* sp.
Catopsilia menille.
C. Argante Fabr. 2.
C. Eubele Linn.
C. sp. ?
Ageronia feronea Hübn.
A. fornax Hübn.
Heliconia Rhea.
Heliconia Melpomene Linn. 2.
Thyridia psidii Cram. 3.
Ithomyia sao Hübn.
I. sp. ?
Colœnis Dido Linn. 3.
Agraulis vanillæ Linn.
Anartia Amalthea Linn.
Catagramma peristera Hew. 4.
C. sorana v. *Latona.*
C. sp. ?
Epicalia sp. ?
Aganisthos Orion Fabr. 3.
Megistanis Deucalion Feld.
M. Barotus Boisd. 3.
Morpho sp.
? *Limenitis* sp.

*The determinations accompanying, have not been verified.

Stalachtis phlegea Cram.
Batesia pyola Drury.
Thecla Marsyas Linn.
Eudamus Catillus Cram.
Telegonus Mercator Fabr.
Pyrrhophaga Acastus Cram.
P. Phidias Linn.
Esthena bicolor. 2.

Fifty-two examples of Lepidoptera from New York State, viz.:

Papilio Asterias Fabr. 2.
Papilio Philenor Linn.
Papilio Troilus Linn.
Colias Philodice Godt. 2.
Euptoieta Claudia (Cramer).
Pyrameis huntera (Fabr.). 2.
Pyrameis cardui (Linn.). 2.
Junonia coenia (*Boisd.*). 2.
Deilephila lineata (Fabr.)
Homoptera lunata Drury. 3.

Other *Noctuidæ*, 8 examples; *Hypenidæ*, 9 examples; *Geometridæ*, 6 examples; *Pyralidæ*, 11 examples; *Tineidæ*, 1 example. From ERASTUS CORNING, JR., Albany, N. Y.

Larva of *Papilio Philenor* Linn., feeding on *Aristolochia sipho*, and its chrysalis, July 25th. Eggs of *Grapta interrogationis* (Fabr.), June 20th. From Mrs. E. W. K. LASELL, Orange, N. J.

Pupa of *Sphinx quinquemaculata* Steph. From JOHN HENRY, East Worcester, N. Y.

Larva of *Thyreus Abbotii* Swainson. From JACOB H. HOUCK, Central Bridge, N. Y. The same, from CHARLES H. RAMSEY, Howes Cave, N. Y.

Melitta cucurbitæ (Harris), ♂ and ♀, June 24th. From Prof. C. H. PECK, Albany, N. Y. The same, four examples, taken July 20th and August 3d. From H. VAN SLYKE, Coxsackie, N. Y.

A colony of young larvæ of *Halisidota caryæ* (Harris), feeding on cherry leaves, July 22d. From IRA W. HOAG, Pawling, N. Y.

Larva of the "saddle-back," *Empretia stimulea* Clemens, from corn, August 24th. From Mrs. E. W. K. LASELL, Orange, N. J.

Cases of *Thyridopteryx ephemeræformis* (Haworth). From M. W. VANDENBERG, Fort Edward, N. Y. The same, and eggs of *Hyperchiria Io* (Fabr.) from Mrs. E. W. K. LASELL, Orange, N. J.

Larvæ of *Cacœcia rosaceana* (Harris), eating into pear-buds, May 22d. From W. P. RUPERT & SONS, Seneca, N. Y.

"Jumping-seeds" containing larvæ of *Carpocapsa saltitans* Westw., September 25th, obtained from the U. S. Consul at Guaymas, Sonora, Mexico. From W. E. WALSH, Benson, Arizona.

Apple leaves containing the larvæ of *Tischeria malifoliella* Clemens, September 10th. From Prof. C. H. PECK, Albany, N. Y.

Wheat infested with the Angoumois moth, *Sitotroga cerealella* Oliv., and abounding with the remains of *Heteropus ventricosus* Newport. From L. S. Macon, Charlottesville, Va.

Cocoons of *Bucculatrix pomifoliella* Clemens. From Prof. C. H. PECK, Menands, N. Y. The same, from W. J. STRICKLAND, Albion, N. Y.

Cases of *Tinea pellionella* Linn., containing the larvæ, November 15th. From H. C. COON, M. D., Alfred Centre, N. Y.

IN DIPTERA.

Larvæ and imagines of *Sciara* sp. from mushroom beds, March 20th. From CHARLES ELLERY, Albany, N. Y. The same, May 7th, from WILLIAM FALCONER, Glen Cove, N. Y.

Bibio albipennis Say, from apple-trees. From J. C. WHITEHILL, Meadsville, Pa.

Eristalis tenax (Linn.), several examples. From Mrs. E. B. SMITH, Coeymans, N. Y.

IN COLEOPTERA.

Hydrophilus triangularis Say, living, October 21st. From CHARLES SCHWARTZ, Albany, N. Y.

Silvanus Surinamensis (Linn.) infesting a dwelling-house. From HENRY HANSON, Catskill, N. Y.

Dermestes lardarius Linn. From J. M. ADAMS, Watertown, N. Y.

Anthrenus scrophulariæ Linn., and *Attagenus piceus* (Oliv.). From Mrs. E. B. SMITH, Coeymans, N. Y.

Ips fasciatus Oliv., several examples, July 4th, eating into squash vines. From Prof. C. H. PECK, Menands, N. Y.

Limonius confusor Lec., feeding on quince blossoms, May 20th. From A. H. BRIGGS, Macedon, N. Y.

Larvæ, pupæ, and imagines of *Ptinus quadrimaculatus* Melsh., in green calf-skins, January 23d. From GEORGE H. THOMAS & Co., Middleville, N. Y.

Ptinus brunneus Duft., from the herbarium of Middlebury College. From Prof. HENRY M. SEELY, Middlebury, Vt.

Neoclytus erythrocephalus (Fabr.), from *Xyleborus* infested pear twigs, February 11th. From NORMAN POMROY, Lockport, N. Y.

Desmocerus palliatus (Forst.), June 15th. From Mrs. E. W. K. LASELL, Orange, N. J.

Monohammus confusor (Kirby), emerged from a painted floor, July 2d. From CHAS. H. RAMSEY, Howes Cave, N. Y.

Hyperplatys maculatus Hald. From Prof. C. H. PECK, Albany, N. Y.

Criocerıs asparagi (Linn.), June 8th. From A. S. PLYMPTON, Hartford, Conn. The same, from AUGUSTUS FLOYD, Moriches, N. Y.

Paria aterrima (Oliv.), from strawberry plants, August 27th. From A. W. CHEEVER, Dedham, Mass.

Galeruca xanthomelæna (Schrank). From A. L. BROWN, M. D., Cornwall-on-Hudson, N. Y.

Larvæ of *Haltica chalybea* Illig., infesting grape-vines, June 19th. From GEORGE C. SNOW, Penn Yan, N. Y.

Chelymorpha Argus Licht., feeding on the leaves of pea-vines, July 22d. From PETER HENDERSON, New York city.

Nyctobates Pennsylvanica De Geer, and *Alaus oculatus* Linn. From DAVID CROUSE, Summit, N. Y.

Otiorhynchus ovatus (Linn.), from strawberry plants, August 27th. From A. W. CHEEVER, Dedham, Mass. The same, as a pest in dwellings. From Miss A. CLARKSON, Potsdam, N. Y.

Calandra granaria Linn., infesting seed-corn. From Mr. A. DOWD, Utica, N. Y.

IN HEMIPTERA.

Podisus modestus (Dallas) larva, June 26th, preying on larvæ of *Haltica chalybea*. From GEORGE C. SNOW, Branchport, N. Y.

Lygus (lineolaris Pal. Beauv.) *pratensis* Linn., August 6th, feeding on the tobacco plant. From C. R. HOYT, Osceola, Tioga Co., N. Y.

Emesa longipes De Geer, Sept. 13th. From JOHN ASPINWALL, West Brighton, L. I., N. Y. The same, from Mrs. E. B. SMITH, Coeymans, N. Y.

Belostoma Americanum Leidy, April 18th. From C. N. PRINDLE, Johnstown, N. Y. The same, September 11th. From Prof. RALPH W. THOMAS, Albany, N. Y.

Cicada tibicen Linn. From Mrs. E. B. SMITH, Coeymans, N. Y.

Siphonophora avenæ (Fabr.), on wheat, June 1st. From A. HERSHOG, Allendale, Ill. The same, from R. ELLISON, LaGrange, Ill. The same, from C. C. HARDENBERG, Stone Ridge, N. J.

Melanozanthus sp. ? feeding on *Celastrus scandens*, September 3d. From M. W. VANDENBERG, M. D., Fort Edward, N. Y.

Galls of *Phylloxera depressa* (Shimer) on hickory leaves, June 24th. From C. H. RAMSEY, Howes Cave, N. Y.

Gossyparia ulmi Goeffry, a coccus on *Ulmus fulva*, at Marlborough, N. Y., July 6th, 1888. (See L. O. Howard, in Insect Life, ii, 1889, pp. 34–41, figs. 1–8, on this species.) From Prof. C. H. PECK, Albany, N. Y.

IN ORTHOPTERA.

Œcanthus niveus Harris, *Œcanthus fasciatus* De Geer, and eggs of the latter in raspberry and snowball (*Viburnum opulus*). From E. A. ALLIS, Adrian, Mich.

Cyrtophyllus concavus (Harris) and *Phyllopteva oblongifolia* De Geer. From Mrs. E. B. SMITH, Coeymans, N. Y.

The "walking-stick," *Diapheromera femorata* (Say). From JONAS H. BROOKS, Albany, N. Y.

IN NEUROPTERA.

Stone caddis-cases of *Limnophilidæ*. From LEROY C. WING, Glens Falls, N. Y. Cases of the same, with living larvæ, May 16th. From CHARLES S. WILLIAMS, Glens Falls, N. Y.

IN THYSANURA.

Isotoma albella Packard, from a filter of Albany city water, February 16th. From JOSEPH H. BLATNER, M. D., Albany.

Lepisma ?domestica Packard, eating laces and paper boxes. From MERWIN & HOLMES, Peekskill, N. Y.

IN ———?

Currant stems girdled by "the currant stem girdler" (insect unknown). From A. H. BRIGGS, Macedon, N. Y.

Twigs of Canadian poplar bored by an unknown larva. From ELLWANGER AND BARRY, Rochester, N. Y.

IN ARACHNIDA.

"The mule-killer," or "the nigger-killer," *Thelyphonus giganteus* Latr. From W. E. WALSH, Benson, Arizona.

Chernes Sanborni Hagen, two examples from the legs of a fly, July 1st — sp? unknown (not sent). From CHARLES L. WILLIAMS, Belleville, N. Y. The same, August, from legs of *Xylotrechus*. From Mr. POLAND, Beedes, Essex county, N. Y.

Uropoda Americana Riley, infesting and killing the Colorado potato beetle, May 16th. From SILAS L. ALBERTSON, Roslyn, N. Y.

Tyroglyphus longior Gervais, infesting horse-collars and a carriage-house, July 12th. From ROBERT C. PRUYN, Albany, N. Y.

Heteropus ventricosus Newport, in association with the larvæ of *Sitotroga cerealella* Oliv., in wheat. From L. S. MACON, Charlottesville, Va.

Trichodectes sphærocephalus Nitzsch, infesting the wool of sheep. From J. P. CHAMPLIN, North Blenheim, N. Y.

IN MYRIOPODA.

Scolopendra sp. ? From W E. WALSH, Benson, Arizona.

Cermatia forceps Raf. From J. C. BISSELL, Rome, N. Y.

Julus cæruleocinctus Wood, from cabbage roots. From F. N. TILLINGHAST, Greenport, N. Y.

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ERRATA IN FIFTH REPORT.

Page 148, line 4, for zanthomelæna read xanthomelæna.
Page 170, line 7, for Dallas read (Dallas).
Page 174, line 17, transfer first comma from after chœrocampa to before.
Page 213, line 3, for Boisdaval read Boisduval.
Page 219, line 19, for ac ss read across.
Page 224, line 3 from bottom, and p. 225, line 12, for Boder read Bodee.
Page 224, line 9 from bottom, for L. A. Howard read L. O. Howard.
Page 231, *dele* first and third paragraphs, relating to tobacco feeding.
Page 257, line 15, for Guer read Guér.
Page 268, line 14, for subjec read subject.
Page 282, line 1, for *Trypetdiæ* read *Trypetidæ*.
Page 283, line 22, for Thirth read Thirty.
Page 283, line 3 from bottom, in foot-note, for more read less.
Page 295, line 17, for Raf. read (Raf.).
Page 313, bottom line, for he read the.
Page 330, line 24, for Prionatus read Prionotus.
Page 331, line 20, col. 1, transfer 321 to line 21.
Page 332, line 12 from bottom, for 179 read 177.
Page 335, read Julus cæruleocinctus, 307, 326.
Page 338, line 21, for Ormerod read Ormerod.
Page 343, line 16, for 323 read 324.

NOTE.—This leaf may be transferred to the Fifth Report by those who have received copies thereof not containing the above table—nearly 600 copies having been distributed without it.

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